



**Using Video Modeling via iPad to Improve the  
Participation of a Child with an Autism  
Spectrum Disorder in Reciprocal Play with  
Peers**

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### Abstract

Children with disorders of the autism spectrum are impaired in their social interaction and communication and they show restricted, repetitive and stereotyped patterns in their behavior, interests and activities. In this study video modeling was used to improve the participation of a 5-year-old boy diagnosed with an autism spectrum disorder in reciprocal play with peers. Multiple-baseline within child across situations was used to assess the effect. In situation A there was a baseline, video modeling and withdrawal period compared to baseline period in situation B. Three dependent variables were measured: Delay of initiative to play, time spent in reciprocal play and frequency of sounds and words made. Results indicate that video modeling did decrease the delay of initiative to play and increase the time spent in reciprocal play and the frequency of words and sounds made during playtime.

### Útdráttur

Börn með einhverfurófsröskun sýna skerta getu til þess að taka þátt í félagslegum samskiptum, skerta færni í máli og tjáskiptum og sérkennilega og áráttukennda hegðun. Í þessari rannsókn var myndbandseftirhermun notuð til þess að bæta þátttöku í gagnkvæmum leik við jafnaldra. Þátttakandi var fimm ára drengur sem greindur var með röskun á einhverfurófi. Snið margþætts grunnskeiðs milli mismunandi aðstæðna hjá drengnum var notað til þess að meta áhrif myndbandseftirhermunar. Í aðstæðum A var tímabil grunnskeiðs, myndbandseftirhermunar og brottnámsskeið þar sem myndband er tekið út aftur líkt og á grunnskeiði, í samanburði við grunnskeið í aðstæðum B. Þrjár fylgibreytur voru mældar, það er töf til frumkvæðis til leiks, tími í gagnkvæmum leik, tíðni orða og hljóða á leiktíma. Niðurstöður gáfu til kynna að myndbandseftirhermun minnkaði töf á frumkvæði til leiks en jók tíma sem varið var í gagnkvæman leik og tíðni orða og hljóða í leik.

*Keywords:* video modeling, autism spectrum disorder, iPad, reciprocal play, delay of initiation

### Forewords and Acknowledgements

Submitted in partial fulfillment of the requirements of the BSc Psychology degree, Reykjavík University, this thesis is presented in the style of an article for submission to a peer-reviewed journal.

This study was approved by The National Bioethics Committee of Iceland (no: VSNb2012120005/03.07).

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## Using Video Modeling via iPad to Improve the Participation of a Child with an Autism Spectrum Disorder in Reciprocal Play with Peers

Autism spectrum disorders are neurological disorders characterized by impairment in social interaction and communication and restricted, repetitive and stereotyped patterns of behavior, interests and activities (American Psychiatric Association, 1994). Because of the social impairment, individuals with autism often struggle to develop relationships with others. Autism persists throughout life but it varies in its degree of severity and individuals diagnosed with autism display all levels of ability. This is one of the main reasons why a spectrum of autistic disorders is now generally assumed to exist (Frith, 2001). The diagnosis of an autistic disorder is based on behavioral criteria set out by diagnostic models such as ICD-10 (World Health Association, 2008) and DSM-IV (American Psychiatric Association, 1994).

Social skills are an important factor in a child's development; his ability to interact and connect with others and maintain relationships (Bellini, Akkilian, & Hopf, 2007; Koegel, L. R. Koegel, R. L., Frea, & Fredeen, 2001). Children with autism spectrum disorders differ in their social interaction from children who develop normally (McGee, Feldmann, & Morrier, 1997). Children with autism are less likely than other children to be in close proximity to other children, less likely to have social interactions and to receive social interaction from other children (McGee, Feldmann, & Morrier, 1997; Koegel, L. K., Koegel, R. L., Frea, & Fredeen, 2001).

There is substantial evidence suggesting that children with autism can benefit from early behavioral intervention (Lovaas, 1987; Sigríður Lóa Jónsdóttir, 2000). Lovaas (1987) conducted a study to explore the long-term effects of an individual behavioral modification. The results showed that almost half of the children in the experimental group achieved normal intellectual and educational skills compared to



2% of the children in the control groups. Many behavioral methodologies have been formulated for children with autism and one of them is video modeling. It is based on Bandura's social learning theory about observational learning (Bandura, 1977). Video modeling involves the subject watching a video showing a desired behavior.

Afterwards, the content of the video is practiced and imitated (Corbett, 2003). Usually the child is seated in front of a screen or television monitor and asked to pay attention to the video, presenting a scene showing a desired behavior, after which the child is asked or given an opportunity to perform and imitate the displayed behavior.

### **Why does video modeling work?**

There are many hypotheses about why video modeling works. It has been speculated that the features of autism may be capitalized by video modeling, like over-selective attention (Charlop-Christy & Deneshvar, 2003), restricted field of focus (Garretson, Frein, & Waterhouse, 1990), preference for visual stimuli (Shipley-Benamou, Lutzker, & Taubman, 2002) and avoidance of face-to-face attention (Charlop-Christy, Le, & Freeman, 2000). The television screen provides a restricted field of focus. The method helps improving the attention of individuals with autism by focusing their attention on pertinent stimuli (Charlop-Christy & Deneshvar, 2003; Charlop-Christy, Le, & Freeman, 2000; Shipley-Benamou, Lutzker, & Taubman, 2002) while removing the external visual and auditory stimuli of the environment. By repeatedly exposing the subject to a behavior, the video modeling method encourages that behavior to be permanently memorized (Corbett & Abdullah, 2005). Video modeling is an active process that allows the observed behavior to be practiced. Several studies show that video modeling procedure by virtue of the visual medium are in their nature motivating and reinforcing for individuals with autism (Charlop-Christy, Le, & Freeman, 2000; Corbett, 2003; Corbett, & Abdullah, 2005; D'Ateno,

Mangiapanello, & Taylor, 2003) so there is no need for external reinforcement. Video modeling has been compared to other methods like live modeling (Charlop-Christy, Le, & Freeman, 2000) and reciprocal imitation training (RIT) (Cardon & Wilcox, 2011) and has been shown to be more or equally effective. In addition, video modeling can be time and cost saving compared with other methods.

### **Video modeling to improve social skills**

Video modeling has been used as an effective intervention for children with autism for addressing social-communication skills, functional skills and behavioral functioning (Bellini & Akkulan, 2007). It has been shown to be an effective method that can help children with autism to learn a variety of social-communication behaviors including taking perspectives (Charlop-Christy & Daneshvar, 2003; LeBlanc, Coates, Daneshvar, Charlop-Christy, Morris, & Lancaster, 2003), pretend playing (McDonald, Clark, Garrigan, & Vangala, 2005), social engagement (Bellini, Akullian, & Hopf, 2007), language skills in social situations (Maione & Mirenda, 2006; Taylor, Levin, & Jasper, 1999) and generalized toy playing (Paterson & Arco, 2007).

Some studies have shown that in social situations, the social initiation can be a crucial factor for interaction (as cited in Nikopoulos & Keenan, 2004). Autistic children can learn to respond to the initiation by others, but the challenge for them is to initiate in complex social situations. If initiation on behalf of the child increases, its other social behaviors improve. Nikopoulos and Keenan (2004) examined the effect of video modeling on initiation and reciprocal play with three children with autism. The video showed a normally developing peer. The experimenter engaged in a simple interactive play using one toy. The video was viewed on a television set in a separate room from the room containing the toys. There were four experimental conditions.

First there was a baseline and then two conditions for viewing the video. If a social initiation did not happen after three sessions in the second condition, the child was transferred to the third condition, where the video had been simplified, only showing the social initiation part of the video. In the fourth condition of the experiment, the generalizability was tested by using different toys from those used in the video. During baseline, none of the participants engaged in social initiation. Only one participant engaged in social initiation after the first three sessions. The other two were transferred to the third condition where social latency decreased. For all participants, social latency did eventually decrease and time spent in reciprocal play increased.

Helgi Héðinsson and Sigurður Viðar (2008) conducted a study of a method intended to decrease the latency to social initiation of a child with autism, and to increase the frequency and the time spent in social interaction with his peers in natural settings. The participant was a boy with autism. The intervention was introduced in two different settings. The video showed three peers. Two peers were playing. The third child entered and asked to participate in the play with them. The results showed that video modeling did decrease the latency to social initiation in both settings but the frequency and time spent in social interaction was neither stable nor clear between settings.

In a study using video modeling, McDonald, Sacramone, Mansfield, Wiltz, and Ahearn (2009) taught children with autism to engage in reciprocal pretend play with normally developing peers by measuring scripted and unscripted frequency of verbalizations and behaviors. Participants in the study were two pairs of children, each pair consisting of a child with autism and a normally developing child. In the study, three different play sets were used and scripts were developed for each of them.

The video showed two adults acting out a scripted sequence of pretend play with the three different play sets. The video viewing session was continued until the child with autism demonstrated a mastery of all levels of scripted verbalizations and actions. The study showed that video modeling was extremely effective if it went with enough training. Both pairs of children exhibited rapid acquisition of scripted verbalizations and play actions, and the performance was maintained in the follow-up. However, the unscripted behavior was not as effective.

Video modeling can be made more accessible for many children with autism by using computers and similar devices. The technology is constantly progressing, television sets and desktop computers being increasingly replaced by handier equipment like tablets and laptops. A few studies have used video modeling and the new technology to teach children with autism (Cihak, Ayres, & Smith, 2010; Þórhalla Guðmundsdóttir, 2012). Cihak, Ayres, and Smith (2010) used video iPod, a handheld device, to help children with autism spectrum disorders to transition between locations and activities within their school. Þórhalla Guðmundsdóttir (2012) investigated the effect of video modeling via iPod touch on the social interaction of four children with autism spectrum disorders. The video shown on the device featured a peer who initiated a communication with two other peers and played with them. Three dependent variables were measured; latency of initiative to play, time spent in reciprocal play, and frequency of words and play-sounds. There were four experimental stages; baseline, intervention, generalization, and follow-up. In the generalization period the child was put in different situations, first with new playmates, secondly with a larger group of playmates and thirdly in a new classroom with more children and other stimuli. The results showed that delay in initiating play decreased with all participants in the intervention stage. Evaluation of a generalization

of new playmates and a larger group of playmates showed that delay of initiating play decreased for all participants. In another classroom with more children and other stimuli, three of four participants showed a decrease in delay of initiating play. Time spent in reciprocal play increased and frequency of words and play-sounds increased for all four participants.

The purpose of the present study was to examine the effect of video modeling to improve participation in reciprocal play for a child with autism spectrum disorder. The same dependent variables were measured as in Þórhalla Guðmundsdóttir's research (2012). The three dependent variables were; delay of initiative to play, time spent in reciprocal play and frequency of sounds and words in the reciprocal play. The study used an iPad to show the video to a participant; other studies have not been found using that device. The aim of the study was to use video modeling without any external reinforcement and with a period where the video is withdrawn. The effect was compared to another condition to control for and to examine if there is a generalization between conditions. The study examined how video modeling is effective for a child who has an autism spectrum disorder and an impaired language development. Peers were used as models and playmates because according to Bandura (1977) it is important that models are similar to the participant. The study took place in the participant's natural environment and the video displayed children playing naturally, not following any scripts.

## **Method**

### **Participant**

One preschool-aged boy, who had been diagnosed with an autism spectrum disorder, participated in the study. A pseudonym will be used to protect his anonymity and he will be called Robin. Robin was selected in cooperation with the preschool

staff and had to meet certain criteria, that is, he had to be diagnosed with autism and show impaired initiative in playing with his peers.

Robin was five-years and two months old at the start of the study. He had been diagnosed in a psychological evaluation two years earlier. Robin was under average in language development according to a PLS-4 language development assessment. He only used short sentences to express himself, usually containing two to four words. Results from WPPSI-R showed that Robin was under average intelligence for his age. He had limited ability in pretend play with other children but in some social games like “bowling” and soccer he did show initiative. Robin often engaged in restrictive and stereotyped motor behavior in social situations, e.g. spinning the wheels of a toy car, throwing a toy around or tweaking a string. Robin had no experience in using video modeling before the study started. The preschool offered Robin an individualized program including 5-6 hours of one-on-one education support a week. Before Robin participated his parents signed an informed consent (see Appendix A).

### **Setting**

All sessions were conducted in two of the preschool classrooms, Room I and Room II. Robin watched the video in the central area before entering Room I where the play sessions took place. The central area, where the main activities of the department took place was a large space that connected the other rooms together. Room I was on the right side of a person walking into the central area and Room II on the left side. Rooms I & II were equally sized, each about half the size of the central area. Unlike Room II, Room I was partly split by a wall. The part of the study conducted in Room I took place in its inner part, a more confined space than Room II which made it more difficult to videotape the sessions in Room I. Both rooms had

windows and were bright. Both rooms were fitted with a table and chairs as well as shelves to store toys.

### **Materials**

Two kinds of play sets were used in the study. Toys used in the study were a Moomin ark (see Appendix B) and a livestock animal farm (see Appendix C). The toys were used in pre-tests and appeared to encourage interaction between children.

Sessions were recorded on a Sony video camera. The video used in the video modeling intervention period was shown on an iPad 2 placed in front of the participant in the center area.

### **Experimental Design**

A multiple baseline design across situations was used to establish experimental control. There were two situations in the study, A and B. The situations differed in toys (the Moomin ark and the livestock animal farm), in location (Room I and Room II) and in procedures. Situation A had the Moomin ark and was conducted in Room I. The procedure was divided into three parts, baseline, video modeling and withdrawal period. Situation B had the livestock animal farm, was conducted in Room II and had only one period of procedure, baseline.

Robin's playmates were his peers in the same department as he and they participated in both situations. There were four of them to choose from; the researcher tried to use only two of them. If they were not available the others took their place. The children acted as the models in the video that was recorded. All of the children's parents signed informed consent before they participated (see Appendix D).

**Independent variable.** The independent variable was a video shown to the participant in the intervention period. The video was filmed in the same environment as the study was conducted, that is in Room I. It shows two children playing with the

Moomin ark. The third child enters the room, walks up to the other children and asks, “Can I play with you?” One of the other children replies “Of course you can.” Then the third child sits down, picks up a toy and starts playing with the others. The video had no scripts except for the beginning when the child entering the room asks, “Can I play with you?” The rest of the video shows children playing without receiving any instructions. The video duration was 27 s.

The video was shown to the participant twice. Immediately after viewing the video for the second time the child was given an instruction: “Now you can go in there and play”. The child entered the room where two children were playing as shown in the video. The child got five minutes to show an initiative to play. Neither the researcher nor the preschool’s staff gave an external reinforcement during the sessions.

**Dependent variable.** After Robin had entered the room each time, the session was videotaped for later scoring. The dependent variables were three: Delay of initiating, time spent in reciprocal play and number of words and sounds during the play. All three dependent variables were observed on the video and recorded on a special sheet (see Appendix E). The definitions of dependent variables were based on a study by Þórhalla Guðmundsdóttir (2012). The measured dimensions of the three dependent variables were time and frequency.

***Delay of initiating play.*** The first dependent variable that was measured was the delay of initiating play. This was defined as the time that passed after Robin entered the room until he showed an initiative to play with the other children. Social engagement was defined as an activity or play with peers involving shared toys. The engagement could be verbal or non-verbal. Verbal engagement could be a greeting or asking to participate, for example, “Hi, can I play with you?” Non-verbal engagement



could be sitting down with the other children and picking up a toy, touching the other children or pointing at toys, moving the toy toward the other toys or keeping the toy in proximity to the other toys. As the participant entered the room a stopwatch was started and stopped when the participant showed initiative to play.

***Time spent in reciprocal play.*** The second dependent variable was the time spent in reciprocal play. Reciprocal play was defined as play that requires verbal or behavioral communication with others. Behavioral communication could be waving, pointing, touching and looking at other children, sitting beside them, picking up a toy, showing or giving the toy to the other children. It also counted if Robin used the toy to communicate, spoke on behalf of the toy with toys the other children were using, letting the toy touch the other toys or moving the toy closer to the other children's toys. It also counted if Robin stared at or focused the attention on the toys the other children were playing with. Reciprocal play was considered over if the participant went away from the other children, started solitary play, stopped playing and looked down or the other way.

The time spent in reciprocal play was measured with a stopwatch that was started when Robin showed an initiative to play and stopped 10 seconds after he had stopped reciprocal playing. Robin got 10 seconds to engage in reciprocal play again before the time was stopped. If he came back within the five minutes' session the stopwatch was started again. Then the total time was calculated for each session.

***Frequency of words or sounds.*** The third dependent variable was the frequency of all words or sounds that Robin directed to the other children in reciprocal play or related to the play. It did not count if the sounds or words were part of stereotyped behavior, e.g. something that was not appropriate in the situation or a reverberation from other children. All words were counted even if the pauses between

them were not clear. Play sounds could be the sound of a motor or an animal sound. A sound was considered completed if there was a pause to breathe or if there was a brief silence. The total number of all sounds and words was counted for each session.

### **Procedure**

The National Bioethics Committee approved the research, no: VSNb2012120005/03.07, as well as the BSc Psychology course committee. Approvals were obtained from the preschool committee (See Appendix F) and the principal of the preschool (see Appendix G). The study started in February 2013 and finished in May the same year. Sessions were conducted on weekday mornings between 9 and 10 am or between 12 and 1 pm, except for Thursdays. Each session was videotaped for later scoring and lasted five minutes. Situations A and B were measured alternatively but sometimes two sessions in Situation A were conducted against one session in Situation B.

***Pre-test.*** A few pre-tests were run to observe Robin in social situations with other children, either individuals or a group. In pre-tests, suitable toys were tested; the toy had to encourage social interaction. Pre-tests were also useful for Robin to get used to the video camera and the researcher. The pre-tests were run in the middle of February. Some sessions were videotaped, others were not.

***Baseline.*** Two children sat on the floor of either Room I or II playing with toys, the Moomin ark or the livestock animal farm. The playmates got a few minutes to start playing together before Robin, being situated in the center area, got the instruction “Now you can go in there and play” after which he entered the room where the two other children were playing. The baseline measurements were video taped for later scoring. After the baseline had become stable in situation A (Moomin ark in Room I) the video modeling intervention could start. The baseline continued in

Situation B (livestock animal farm in Room II) as a control for Situation A and for exploring generalization effects.

***Video Modeling.*** The video modeling intervention was conducted in Situation A. The same procedure was used as in baseline except that Robin was directed to sit in a chair in the center area before entering the room. On the table in front of Robin was an iPad. He was then told he could enter “play” on the iPad screen to watch the video. Because of Robin’s difficulties with language it was decided that the video would be paused after the child in the video had asked “Can I play with you?” after which Robin would be asked, “What did he say?” Once Robin had replied correctly the video was resumed. He then watched the whole video again without any pause. After the video finished Robin received the instruction “Now you can go in there and play” after which he entered the room.

***Withdrawal period.*** After the video modeling results had become stable in Situation A the video training was withdrawn and the baseline procedure was repeated. The first session was conducted 2 days after the last video modeling session. The second and third sessions were conducted 15 and 20 days later consecutively after the last video modeling session.

## **Results**

In the pre-test sessions Robin was tested in different social situations to see if he met the criteria for the study. Toys were also tested to see if they would encourage interaction. In the pre-test sessions, Robin did not show any initiation to play if there were two children or more. He communicated a little when he was put in a situation with one child but not in relation to the game the child was playing.

There were 30 valid sessions in both situations and 6 sessions were invalid. A common reason for invalidation was that the playmates disturbed Robin or did something else than playing.

### **Delay of initiation and time spent in reciprocal play**

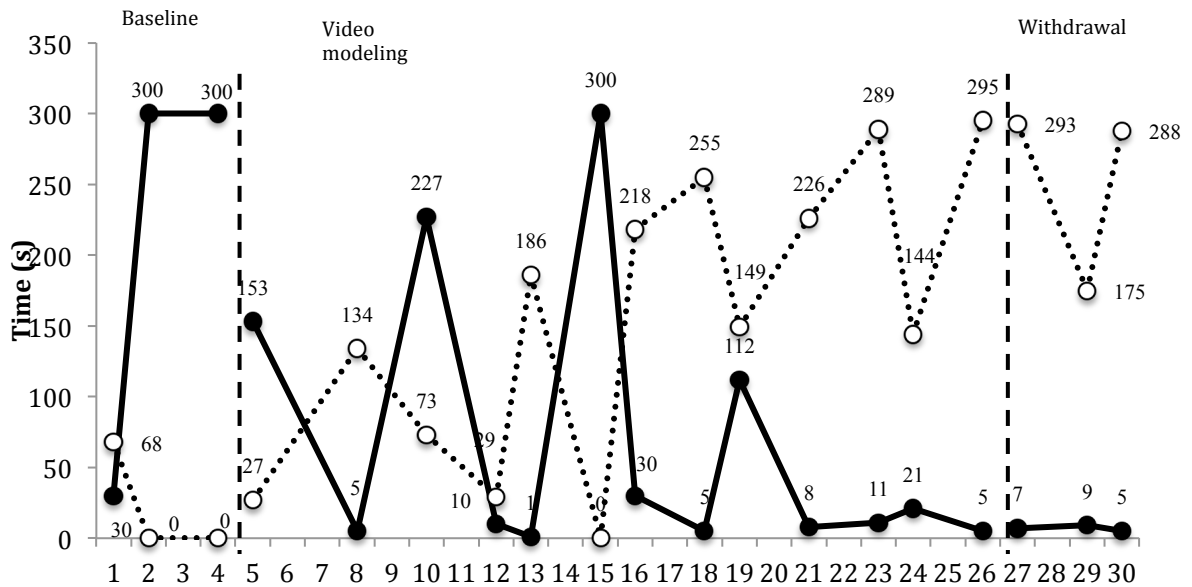
Figure 1 displays the time of delay of initiation and the time spent in reciprocal play across Situations A and B. The sessions on the X-axis represent every valid session measured. Each session lasted 300 s or 5 min. The filled line data points represent the delay of time before Robin showed initiation. The dotted line in Figure 1 represents the data for reciprocal play for each session.

In the first session in baseline of Situation A, Robin showed initiation after only 30 s. The behavior was not congruent with the data, neither in situation B nor in pre-test and it was the first time he had shown initiation to play. In this session Robin sat down with the other children after 30 s and picked up a piece of string with a life buoy. He said one sentence related to the game while turning the string and the play lasted for 68 s. During the next two sessions Robin did not initiate play and the video modeling intervention began.

In Situation A, there was a decrease in delay of initiation and an increase in time spent in reciprocal play during the video modeling. The line for delay of initiation was unstable with fluctuation between short or long/no delay of initiation. In the first session of video modeling Robin showed an initiation when the session was halfway through (153 s). In the second session the delay dropped to 5 s. There were two sessions where the time of delay increased again, in sessions 10 (227 s) and 15 (300 s). In session 10, one of the playmates was new because one of the others was not in school that day. In session 15, Robin did not participate at all in the play which may have been connected with the fact that the preschool had been closed for five

days because of Easter holidays. In session 20 (112 s) there was an increase in delay but not as great as in Sessions 10 and 15. In other sessions the delay was equal or shorter than in the baseline sessions. In sessions 16 to 26, the delay of initiation was short and varied from 30 to 5 s, except for session 20.

### Situation A



### Situation B

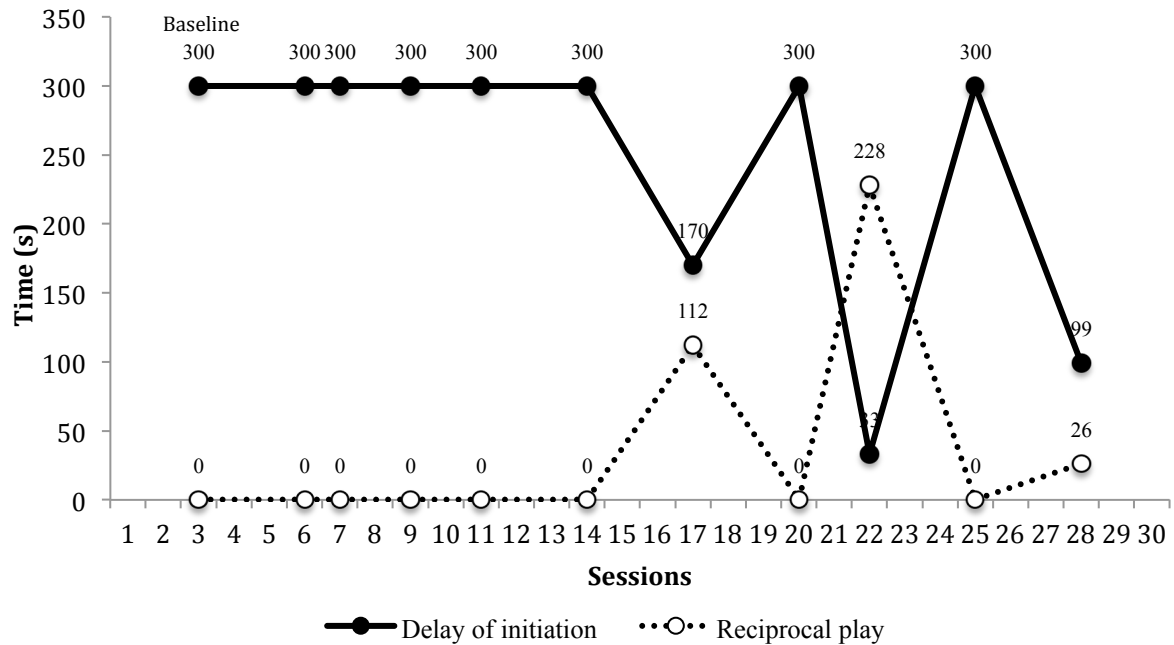


Figure 1. Delay of initiation and time spent in reciprocal play in each session across Situations A and B.

The time spent in reciprocal play in Situation A of Figure 1 displays the positive effects of video modeling. There is an increase in time spent in play from baseline in all sessions, except for sessions 10, 12 and 15. In session 12 the delay was 10 s but the time spent in reciprocal play was 29 s. This session was unlike others in that the delay and the time spent in reciprocal play were short. The time spent in reciprocal play increased with almost every session, but with few setbacks. The sessions with most time spent in reciprocal play were sessions 18 (255 s), 23 (289 s) and 26 (295 s) and after session 15, no data point was lower than in baseline. In three sessions after Robin initiated play he spent the rest of the time in reciprocal play without pausing, sessions 10 (73 s), 23 (295 s) and in withdrawal session 27 (293 s).

The withdrawal session in Situation A can be seen in Figure 1 for both delay of initiation to play and reciprocal play. In all three session of withdrawal the time of delay was short, from 5 to 9 s. In session 27 (293 s) and 30 (288 s) the time of reciprocal was long. However, in session 29 the time spent in reciprocal decreased and was 175 s.

After session 15 a degree of stability can be discerned as the lines for delay of initiation and reciprocal play do not cross. There was a high negative correlation between delay of initiation and the time spent in reciprocal play,  $r = -.744$ ,  $p < .001$ .

In the first six sessions of baseline in Situation B Robin did not show any initiation to play. In session 17 he participated in play after a 170 s delay. In the next session of Situation B Robin did not participate. In session 22 Robin participated again after a 33 s delay. In session 25 Robin did not participate. In session 28 Robin participated for the third time after 26 s. The total time spent in reciprocal play in session 17 was 112 s, 228 s in session 22 and 99 s in session 28.

Frequency of words and sounds

Figure 2 displays the frequency of words and sounds Robin made in each session across Situations A and B. In the first session of baseline Situation A Robin spoke four words, but because he did not participate in the play in the other two sessions no words or sounds were measured. The positive effect of video modeling intervention in Situation A is seen even though the frequency was unstable.

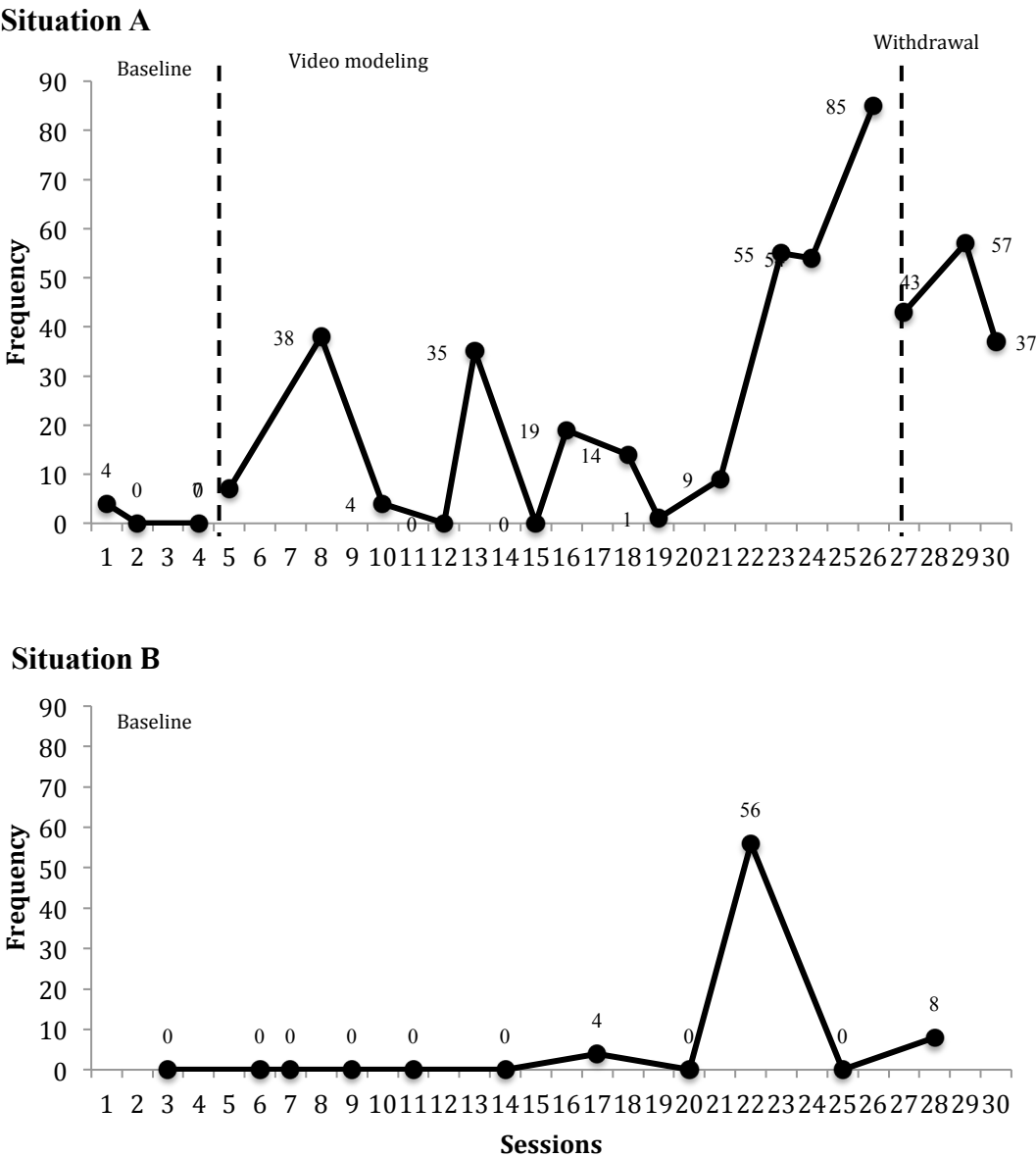


Figure 2. Frequency of words and sounds made in each session across Situations A and B.

Robin spoke equally many or more words and sounds than in baseline in all sessions except for three. These three sessions were sessions 12, 15 and 19. In session 12 the time spent in reciprocal play was only 29 s and Robin made no sounds or words. In Session 15 he did not participate in the play but in 19 Robin did participate in the play after 112 s and the time spent in reciprocal play was 149 s. The largest increase in the number of words and sounds was in session 22. In session 26 Robin spoke the greatest number of words and sounds, or 85.

The three sessions of the withdrawal period in Situation A were in line with the latest sessions of video modeling, sessions 27, 28 and 29.

In Situation B, Robin did not participate in the play in any session except for sessions 17, 20 and 27. In session 17, Robin made four sounds and words and in session 20 he made 56 words and sounds. In the last, session 27 he made 8 sounds and words.

There was a high positive correlation between the number of sounds and words and the time spent in reciprocal play,  $r = .713, p < .001$ . There was also a negative correlation between the number of sounds and words and the time of delayed initiative to play,  $r = -.567, p < .05$ .

### **Discussion**

In this study the effect of video modeling on delay of initiative to play, time spent in reciprocal play and frequency of words and sounds was examined. Even though the effect of video modeling on delay of initiative to play and time spent in reciprocal play was unstable in the first sessions the effect became clearer after six sessions of video modeling. In the last seven sessions the delay of initiative was relatively low and time spent in reciprocal play relatively high and increased with each session. These results indicate that video modeling had an effect after a few



sessions. In the video modeling period there was only one session where Robin did not show any initiative to play. The results also indicate that the behavior learned from video modeling was maintained in the withdrawal sessions, in 2, 15 and 20-day follow-ups. In the last session of video modeling and the first session of withdrawal Robin played the entire time after he showed initiative to play.

There was a negative correlation between these two variables that indicated that when the delay decreased the time spent in reciprocal play increased. These results are in line with the results of previous studies (Nikopoulos & Keenan, 2004; Þórhalla Guðmundsdóttir, 2012) that with a decreased delay of initiation other behaviors such as reciprocal play and verbalization increased. It could be that with quicker initiation the time spent in reciprocal play increases because the play is reinforcing for the initiation.

The measurement of Situation B showed evidence of generalization and control. In the first six sessions of Situation B Robin did not participate in the play whereas he did participate in the play in Situation A which suggests that no other variables were systematically affecting the results in Situation A than video modeling. This presumption is strengthened by the fact that Robin had the same playmates in both situations, he was the participant in both situations and the situations were conducted alternatively at the same time. After the performance in Situation A began to improve and become stable, Robin did show some initiative to play in Situation B. This might suggest that there was some generalization affecting Situation B. With each session Robin and his peers got more used to each other. The peers were the same in both situation and may have become discriminative stimulus for initiation. That could partially explain why there was some generalization effect between situations and the maintenance in withdrawal.

The effect of the video modeling on the number of words and sounds is clear even though it alternated between sessions. The frequency increased with each session and was maintained in the withdrawal sessions. The time of reciprocal play increased as the frequency of sounds and words increased and the delay of initiation decreased as the frequency of sounds and words increased. It is difficult to explain the number of words and sounds in session 22 in Situation B. In that session, Robin showed initiative after about 30 seconds and spent a relatively long time in reciprocal play.

It is interesting that Robin never said “Can I play?” as the model in the video had said, even though the video was paused and Robin was to repeat what the model had said. Robin did, however, use other words that the model had used while playing but he never used this particular sentence to initiate. Normally, Robin used non-verbal behavior to initiate with the others, possibly because of his language impairment.

There was a considerable difference in Robin’s performance from one day to the other that might be explained by external factors. In February and March, when the experiment started the weather was cold but at the end of April and the beginning of May it improved. When the sessions were conducted, other children were also in the central area but when the weather improved they went out to play and then there was more quiet and privacy in the central area. That could explain why there was more improvement in the last sessions conducted in April and May when the weather improved. Robin also became tired if he had been through a tight schedule in the preschool before the session was conducted and this may have had a detrimental effect on his performance.

The figures do not tell the whole story of Robin’s progress. His ability in pretend play and verbalization increased even though sometimes the play was

solitary. A teacher in Robin's department and the remedial teacher of the preschool gave a short report after the study was conducted. They reported that after the intervention Robin showed more initiative and participated more in various activities with his peers. Before the study started Robin showed an interest in playing but lacked the ability to participate, which he started to show after the intervention started. The teachers expressed interest in using video modeling in the future to improve social behavior of other children.

This study had a few limitations. First, it would have been useful to include a video modeling intervention in Situation B to explore the effect of video modeling on different toys and conditions, but this would have required greater stability and time than were available now. Second, it would have been beneficial to control for more extraneous factors, e.g. have the same playmates in all sessions and have more privacy. Third, it would have been interesting to see how the effect of video modeling is maintained for several weeks and even months. Even though the withdrawal results gave some information it is necessary to examine how behavior learned from video modeling is maintained for a longer time period.

Despite the limitations of the study, the findings provide information on the effectiveness of video modeling for a child with an autism spectrum disorder and impaired language development and an evidence of generalization between similar situations. There was also evidence for maintenance of the behavior. Further research is needed to examine the effect of generalization because in many situations the goal is to teach the participant behavior that he or she can use in other similar situations. Also, future studies should examine the effects of video modeling across participants with varying ability levels to define for which individuals the intervention is most

effective. Last but not least, the participant enjoyed using the iPad and its use, therefore, can be recommended in future studies.

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## Appendix A



HÁSKÓLINN Í REYKJAVÍK  
REYKJAVIK UNIVERSITY

**Myndbandseftirhermun með iPad til þess að auka þátttöku barns á einhverfurófi í  
leik við jafnaldra**

Kópavogur, 7. janúar 2012

Kæru foreldrar

Ég undirrituð, Elín Anna Baldursdóttir, er nemi á þriðja ári í sálfræði við Háskólann í Reykjavík. Ég er að vinna að rannsókn fyrir lokaverkefni mitt undir leiðsögn Þorláks Karlssonar, Ph.D., dósents við sálfræðisvið Háskólans í Reykjavík.

Tilgangur rannsóknarinnar er að vinna með félagsfærni hjá börnum á einhverfurófi. Í rannsókn minni óska ég eftir þátttöku sonar ykkar. Áður en þið takið ákvörðun um þátttöku hans er mikilvægt að útskýra af hverju þessi rannsókn fer fram og um hvað hún snýst. Þetta er upplýsingaskjal um þátttöku, sem útskýrir tilgang, áhættu og kosti rannsóknarinnar. Ef það er eitthvað sem er óskýrt mun ég með ánægju útskýra það fyrir ykkur. Endilega takið eins langan tíma og þið þurfið til þess að lesa þessar upplýsingar. Þátttakan á að grundvallast á því að þið skiljið hvers er krafist og að þið hafið haft rúman tíma til þess samþykkja þátttöku. Með fyrirfram þökk fyrir lesturinn.

**Tilgangur rannsóknarinnar**

Tilgangur rannsóknarinnar er að auka félagsfærni hjá barni á einhverfurófinu. Aðferðin sem notuð verður er svokölluð myndbandseftirhermun.

Myndbandseftirhermun er byggð á herminámi þar sem einstaklingur lærir hegðun af öðrum með að horfa á hana af myndbandi. Þessi aðferð hefur virkað vel á börn á einhverfurófinu og hefur verið notuð til þess að kenna ýmsa félagslega hæfni eins og t.d. það að sjá sjónarmið annarra, samskipti og

ímyndunarleik. Tvær aðrar íslenskar rannsóknir hafa sýnt að myndbandseftirhermun jók félagsfærni barna á einhverfurófi þar sem frumkvæði þeirra og samskipti eflast, og sá tími sem varið er í leik lengdist.

### **Hvað þýðir það að taka þátt.**

Það er ykkar að ákveða hvort þið viljið að sonur ykkar taki þátt í rannsókninni. Ef þið ákveðið að taka þátt verðið þið beðin um að undirrita aftasta skjalið og geyma þetta upplýsingaskjal. Ef þið viljið á einhverjum tímapunkti draga son ykkar út úr rannsókninni eftir að hún er hafin þá er ykkur frjálst að gera það hvenær sem er án þess að þurfa að gefa neinar útskýringar.

Ef þið takið þá ákvörðun að taka þátt mun rannsóknin hefjast í janúar 2013 og mun henni ljúka í mars sama ár. Rannsóknin mun fara fram innan leikskólans Furugrund en unnið verður í samstarfi við starfsfólk hans.

Eins og fram kom hér að ofan heitir aðferðin sem beitt verður myndbandseftirhermun. Byrjað verður á því að skrá og kanna félagslega hegðun sonar ykkar í leik. Síðan verður honum sýnt myndband af þremur samnemendum úr leikskólanum að leika sér í einu rými leikskólans en hann fær síðan tækifæri til þess að herma eftir þeirri hegðun sem sýnd var í myndbandinu. Til þess að auðvelda mælingar og skráningu yrði hegðun hans tekin upp á myndband. Hver rannsóknarstund mun ekki taka langan tíma eða u.þ.b. 10-15 mínútur. Flestar mælingar færu fram í janúar og febrúar en til þess að fylgja þessu eftir og kanna hvort hegðun viðhelt færu nokkrar mælingar fram í mars.

Eins og fram kom hér að ofanverðu hefur myndbandseftirhermun sýnt það að hún er áhrifarík aðferð til þess að auka félagsfærni barna á einhverfurófi. Mögulegt er að einstaklingur auki félagsfærni sína og muni þar af leiðandi eiga í meiri samskiptum við önnur börn og sýna meira frumkvæði í leik. Farið verður með allar upplýsingar sem trúnaðarmál sem enginn óviðkomandi hefur aðgang að. Við birtingu verður hvorki hægt að rekja niðurstöður til sonar ykkar né leikskólans. Þegar þátttöku er lokið munu þið fá yfirlit yfir helstu niðurstöður.

Þegar úrvinnslu rannsóknarinnar lýkur og niðurstöður liggja fyrir er hugsanlegt að þær verði birtar í vísindaritum. Öllum rannsóknargögnum verður

eytt sex mánuðum eftir að úrvinnslu lýkur en verða fram af því geymd í læstum skáp hjá leiðbeinanda.

Ef frekari upplýsinga er óskað er mér ánægja að veita þær og er best að senda fyrirspurnir á neðangreint netfang en einnig er hægt að hafa samband símleiðis við mig. Vinsamlega skrifið nafnið ykkar, nafn barnsins á næstu síðu og skilið til leikskólans, ef þið veitið samþykki.

Ef þið hafið einhverjar áhyggjur vegna þessarar rannsóknar og viljið tala við einhvern í trúnaði, er hægt að hafa samband við yfirmann sálfræðideildar, Háskólans í Reykjavík, dr. Bryndísi Björk Ásgeirsdóttir s. XXX-XXXX, eða við leiðbeinanda minn, dr. Þorlák Karlsson, s. XXX-XXXX.

*Ef þú hefur spurningar um rétt þinn sem þátttakandi í vísindarannsókn eða vilt hætta þátttöku í rannsókninni getur þú snúið þér til Vísindasiðanefndar, Hafnarhúsinu, Tryggvagötu 17, 101 Reykjavík. Sími: 551-7100, fax: 551-1444.*

Virðingarfyllst;

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Dr. Þorlákur Karlsson, dósent  
ábyrgðarmaður rannsóknarinnar  
Menntavegur 1, Reykjavík

---

Elín Anna Baldursdóttir,  
BS nemi í sálfræði, rannsakandi



HÁSKÓLINN Í REYKJAVÍK  
REYKJAVÍK UNIVERSITY

## Samþykki

### Myndbandseftirhermun með iPad til þess að auka þátttöku barns á einhverfurófi í leik við jafnaldra

Þorlákur Karlsson, dósent  
ábyrgðarmaður rannsóknarinnar  
Menntavegur 1, Reykjavík

Elín Anna Baldursdóttir,  
BS nemi í sálfræði, rannsakandi

1. Ég staðfesti það að ég hef lesið upplýsingarnar um rannsóknina  
hér að ofan og hef fengið tækifæri til þess að spyrja spurninga sem hana varða. ☐
2. Ég er ánægður með þær upplýsingar sem veittar eru og  
hef fengið nægan tíma til þess að íhuga þær. ☐
3. Mér er kunnugt að þátttaka mín er frjálst val og að mér er frjálst að  
draga barnið mitt út úr henni hvenær sem er, án þess að gefa upp ástæðu  
og án þess að það hafi áhrif á lagalegan rétt minn. ☐
4. Ég samþykki að taka þátt í ofangreindri rannsókn. ☐

\_\_\_\_\_  
Nafn þátttakanda:

\_\_\_\_\_  
Nafn foreldris:

\_\_\_\_\_  
Dagsetning:

\_\_\_\_\_  
Undirskrift

\_\_\_\_\_  
Nafn rannsakanda :

\_\_\_\_\_  
Dagsetning:

\_\_\_\_\_  
Undirskrift

\_\_\_\_\_  
Nafn þess er leggur samþykki fyrir:

\_\_\_\_\_  
Dagsetning:

\_\_\_\_\_  
Undirskrift

Appendix B



Appendix C





## Appendix D



HÁSKÓLINN Í REYKJAVÍK  
REYKJAVÍK UNIVERSITY

Kópavogur, 6. janúar 2013

Kæru foreldrar.

Ég undirrituð, Elín Anna Baldursdóttir, er nemi á þriðja ári í sálfræði við Háskólann í Reykjavík. Ég er að vinna að rannsókn fyrir lokaverkefni mitt undir leiðsögn Þorláks Karlssonar, Ph.D., dósents við sálfræðisvið Háskólans í Reykjavík.

Ég óska eftir þátttöku barns ykkar í þessari rannsókn. Tilgangur rannsóknarinnar er að vinna með félagsfærni hjá börnum á einhverfurófi. Hlutverk ykkar barns myndi vera að leika við samnemendur sína og verður leikurinn tekin upp á myndband sem rannsakendur munu nota. Myndbandið er notað til þess að sýna dreng á einhverfurófi í von um að hann hermi eftir leik annarra barna.

Farið verður með allar upplýsingar sem trúnaðarmál og hefur enginn óviðkomandi aðili aðgang að gögnum rannsóknarinnar. Við birtingu niðurstaðna verður hvorki hægt að rekja upplýsingar til ykkar barns né leikskólans. Áætlað er að rannsóknin sjálf muni fara fram í janúar, febrúar og mars 2013 og í einu af rými leikskólans. Hver rannsóknarstund mun taka u.þ.b. 10-15 mínútur.

Með þessu bréfi vil ég biðja ykkur um leyfi fyrir þátttöku ykkar barns. Ef þið samþykkið þátttöku en viljið draga ykkar barn út úr rannsókninni eftir að hún er hafin þá er ykkur frálst að gera það hvenær sem er án nokkurrar útskýringar. Ef frekari upplýsinga er óskað er mér ánægja að veita þær og er best að senda fyrirspurnir á neðangreint netfang. Vinsamlega skrifið nafn ykkar og nafn barnsins ykkar samþykkisblaðið og skilið til leikskólans ef þið veitið samþykki.

Virðingarfyllst,

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Dr. Þorlákur Karlsson, dósent  
ábyrgðarmaður rannsóknarinnar  
Menntavegur 1, Reykjavík

---

Elín Anna Baldursdóttir,  
BS nemi í sálfræði, rannsakandi



HÁSKÓLINN Í REYKJAVÍK  
REYKJAVIK UNIVERSITY

### Samþykki

#### **Myndbandseftirhermun með iPad til þess að auka þátttöku barns á einhverfurófi í leik við jafnaldra**

Þorlákur Karlsson, dósent  
ábyrgðarmaður rannsóknarinnar  
Menntavegur 1

Elín Anna Baldursdóttir,  
BS nemi í sálfræði, rannsakandi

Ég hef kynnt mér upplýsingar og aðstandandi rannsóknarinnar hefur veitt mér þær útskýringar sem ég hef óskað eftir. Mér er kunnugt að þátttaka mín er frjálst val og að mér er frjálst að draga barnið mitt út úr henni hvenær sem er, án þess að gefa ástæðu og án þess að það hafi áhrif á lagalegan rétt minn. Ég tel mig skilja tilgang rannsóknarinnar og veiti því óþvingað og samþykkt leyfi fyrir því að barnið mitt; \_\_\_\_\_ taki þátt í þessari rannsókn.

_____	_____	_____
Nafn foreldris:	Dagsetning:	Undirskrift
_____	_____	_____
Nafn rannsakanda:	Dagsetning:	Undirskrift
_____	_____	_____
Nafn þess er leggur samþykki fyrir:	Dagsetning:	Undirskrift



## Appendix E

[illegible]

## Appendix F



Kópavogur, 5. janúar 2013

Til Menntasviðs XXXXXXX

b.t. XXXXXXXXXX, deildarstjóra leiksskóladeildar

Ég undirrituð, Elín Anna Baldursdóttir, nemi á þriðja ári í sálfræði við Háskólann í Reykjavík óska eftir leyfi til þess að fara í Leikskólann XXXXXXX og vinna þar með einum dreng í þjálfun á félagsfærni. Ég er að vinna að rannsókn fyrir lokaverkefni mitt undir leiðsögn Þorláks Karlssonar, Ph.D., dósents við sálfræðisvið Háskólans í Reykjavík.

Tilgangur rannsóknarinnar er að kanna og framkvæma inngrip sem efla á félagsfærni, með því að auka frumkvæði í leik hjá börnum á einhverfurófi. Inngripið felst í því að sýna barni myndband í iPad með ákveðinni hegðun í þeim tilgangi að auka sömu hegðun hjá því. Fylgst verður með hegðun og hún skráð niður en til þess að hægt sé að fá nákvæmar mælingar verður hegðun tekin upp á myndband.

Farið verður með allar upplýsingar sem trúnaðarmál og foreldrar barns og aðrir þátttakendur beðnir um að skrifa undir upplýst samþykki. Þar er þeim greint frá tilgangi rannsóknar og þeim gert grein fyrir því að þeir megi draga þátttöku sína tilbaka á hvaða tímapunkti sem er án þess að gefa skýringu á því. Við birtingu verður hvorki hægt að rekja niðurstöður til einstakra þátttakenda né leiksskólans. Áætlað er að rannsóknin sjálf muni fara fram í janúar, febrúar og mars 2013. Rannsókn þessi er unnin með samþykki Vísindasiðanefndar og verður tilkynnt til Persónuverndar.

Með þessu bréfi óska ég eftir leyfi til að gera ofangreinda rannsókn í XXXXX í Leikskólanum XXXXXX, XXXXXX.

Virðingarfyllst,

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Dr. Þorlákur Karlsson, dósent,  
ábyrgðarmaður rannsóknarinnar  
Menntavegur 1

---

Elín Anna Baldursdóttir,  
BS nemi í sálfræði, rannsakandi

Staðfest samþykki

Undirskrift

Dagsetning

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XXXXXXXXXXXXXX

## Appendix G



Kópavogur, 7. janúar 2012

Til skólustjóra

Ég undirrituð, Elín Anna Baldursdóttir, nemi á þriðja ári í sálfræði við Háskólann í Reykjavík óska eftir leyfi til þess að fara í Leikskólann XXXXX og vinna þar með einum dreng í þjálfun á félagsfærni. Ég er að vinna að rannsókn fyrir lokaverkefni mitt undir leiðsögn Þorláks Karlssonar, Ph.D., dósents við sálfræðisvið Háskólans í Reykjavík. Ég óska einnig eftir samvinnu við XXXXXX sérkennslustjóra við leikskólann.

Tilgangur rannsóknarinnar er að kanna og framkvæma inngrip sem efla á félagsfærni, með því að auka frumkvæði í leik hjá börnum á einhverfurófinu. Inngripið felst í því að sýna barni myndband með ákveðinni hegðun í þeim tilgangi að auka sömu hegðun hjá því. Til þess að meta áhrif inngrips er nauðsynlegt að skrá hegðun drengins í samskiptum við önnur börn með eðlilegan þroska, t.d. leikfélaga. Ég óska því eftir samvinnu við sérkennslustjóra og annars samstarfsfólks. Nauðsynlegt væri að taka upp hegðunina á myndband þar sem önnur börn koma í mynd og því nauðsynlegt að fá leyfi frá foreldrum þeirra barna. Hegðun hinna barnanna verður þó ekki skráð á neinn annan hátt.

Farið verður með allar upplýsingar sem trúnaðarmál og foreldrar barns beðnir um að skrifa undir upplýst samþykki, þar sem þeim er greint frá tilgangi rannsóknar og að þeir megi hvenær sem er draga þátttöku sína til baka. Við birtingu verður hvorki hægt að rekja niðurstöður til einstakra þátttakenda né leikskólans. Áætlað er að rannsóknin sjálf muni fara fram í janúar, febrúar og mars 2013 og mun ég ákveða nánari tímasetningar í samvinnu við ykkur.

Með þessu bréfi óska ég eftir leyfi til að gera ofangreinda rannsókn í þínum leikskóla.

Virðingarfyllst,

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Dr. Þorlákur Karlsson, dósent  
ábyrgðarmaður rannsóknarinnar  
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Elín Anna Baldursdóttir,  
BS nemi í sálfræði, rannsakandi

Staðfest samþykki

Undirskrift

Dagsetning

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