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Using video modeling to teach symbolic play to children with autism

Master thesis

Running head: Video modeling and symbolic play
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Abstract

Children with autism often fail to develop the rich repertoires of pretend play seen in typically developing children. Video modeling is a teaching methodology that has been shown to produce rapid acquisition of a variety of skills in children with autism. The purpose of the present study was to teach symbolic play skills to children with autism. Scenes according to the Scripted Symbolic Observation Instrument (SSOI) categories were videotaped using peer of same age and sex as a model. The skills were taught and assessed using the normal play development depicted in SSOI. Results indicated that the video modeling intervention led to rapid acquisition of both verbal and motor responses. In addition generalization to similar looking toys and novel toys took place. Furthermore, current study shows that symbolic play can be taught to this population and that it is joyous for them and may open new developmental paths for children with autism.

Keywords: video modeling, symbolic play, SSOI, generalization, Theory of Mind.

Kokkuvõte

Autistlikele lastele videoga mudeldamise abil sümboolse mängu oskuste õpetamine

Autistlikud lapsed ei suuda sageli normaalse arenguga laste kombel välja arendada sümboolse mängimise oskusi. Videoga mudeldamine on uudne õpetamise metodoloogia, mida on väga edukalt kasutatud erinevate oskuste õpetamisel autistlikele lastele. Käesoleva uurimuse eesmärgiks oli õpetada viiele autismiga lapsele sümboolse mängu mängimiseks vajalikke oskusi. Mängustseenid filmiti lähtuvalt Sümboolse Mängu Skaala (S.M.S.) kategooriatest, kasutades samast vanusest ja soost mudeli. Lapse oskusi hinnati ja arendati lähtudes S.M.S.-ist. Tulemused näitavad, et videoga mudeldamine viis kiirelt verbaalsete ja käitumuslike oskuste omandamisele. Lisaks leidis aset oskuste üldistamine sarnastele ja uutele mänguasjadele. Kokkuvõttes näitab antud uurimus, et sümboolse mängu oskusi on võimalik antud populatsioonile õpetada ning see võib nendele lastele rõõmu pakkuda ja võib uusi arenguvõimalusi avada.

Märksõnad: videoga mudeldamine, sümboolne mäng, S.M.S., üldistamine, meeleteooria

1. Introduction

1.1. Playing

Play might be predominant waking activity of typically developing children (Sutton-Smith 1976, as cited in Rutherford, Young, Hepburn & Rogers, 2007) and typically developing children develop play skills without explicit instruction (Garvey 1991; Moyles 1994, as cited in Rutherford, Young, Hepburn & Rogers, 2007). For most children the development of play follows a predictable course. In children with autistic spectrum difficulties this development is impaired, with play often appearing repetitive, sensory, isolated, concrete and lacking of imagination. When these children use toys they often play with a very limited range of toys and use them atypically (Thomas & Smith, 2004). Wolfberg (1999) describes the way in which children with autism tend to engage in repetitive play, for example, manipulating objects, carrying out routines, lining objects up and following obsessive interests, with an emphasis on sensory stimulation. The behavior is closely related to impairment in 'imagination'. She argues that without specific teaching children with autism are unlikely to engage in functionally appropriate play (Phillips & Beavan, 2007).

Children's play develops from sensory-motor play to pretend play via organizing play and functional play. The development of the stages is described by Beyer and Gammeltoft (2003) as follows:
Sensory-motor play - explorative play involves the child relating to one thing at the time (putting an object into mouth).
Organizing play - toys are organized with no attention given to their specific purpose (toys put in a row, on top of each other).
Functional play - play items are used intentionally, according to their function.
Pretend play - object is treated as if it were something else. Child may pretend that a block is a car (object replacement), or that teddy bear is alive (projection of pretended qualities). It reflects the child's ability to form internal representations (the ability to

imagine what other people are thinking). Reality is ignored.

Williams, Costall and Reddyl (1999) drew attention to evidence of widespread impairments in relating to objects in autistic children, not only in interpersonal aspects of object use, but also in early sensorimotor exploration and the functional and conventional uses of objects. Holmes and Willoughby (2005) claim that it is common for children with autism to choose play objects based on the sensory stimulation they provide (i.e. interesting to smell, touch, hear, taste or see) at the age when typically developing children engage in more sophisticated types of play. Interaction with a play object often lacks the imagination evident in the play of typically developing children (Holmes & Willoughby, 2005). Children with autism have problems in relating to objects, and these problems are serious – objects play such a key role in facilitating interpersonal interaction and in providing a bridge to the development of various social skills, including language (Williams et al., 1999).

Play has been linked to many areas of development, including intellectual, social, and emotional growth. Play is thought to promote intellectual development by providing young children with a context in which he or she can practice their language and communication skills. In addition, play creates an opportunity to fantasize, plan strategies, and solve problems. Social development also occurs through play (Holmes & Willoughby, 2005).

1.2. Video modeling

Video modeling involves the child observing a videotape of a model engaging in a target behavior and subsequently imitating it (Charlop-Christy, Le, & Freeman, 2000).
During the three last decades successful use of video modeling has been demonstrated in teaching various social, academic and functional skills to individuals with autism. The strengths of video modeling for individuals with autism are:

- Provision of more facilitators of generalization as described by Stokes and Baer

(1977). Presently televisions are just about anywhere, thus video viewing has strong associations with the child's natural environments and may serve as "common stimuli" (Stokes & Baer, 1977).

- Video modeling improves motivation. Indeed, children with autism frequently echo phrases heard on television, videos, and commercials; retell dialogue from videos, watch the same videos, or certain parts of videos, over and over again and become "preoccupied" with certain videos or television shows. These all contribute to the probability that watching videos or television may be an effective reinforcement for some children with autism (Charlop-Christy et al., 2000).
- Prevention of what has been named stimulus overselectivity. That is, children with autism may have difficulty responding to multiple cues in their environment which can lead to stimulus overselectivity. This can be prevented to a certain extent in video modeling e.g. by zooming in on the relevant stimuli (Charlop-Christy et al., 2000).
- It furthermore minimizes attention and language requirements, requiring the child only to look at the television monitor and to hear only the minimum necessary language (Sherer et al., 2001).
- Video modeling also reduces reliance on social interaction or the presence of a therapist to promote learning (Sherer et al., 2001).
- Furthermore, video modeling is a means to provide other children as models; hence children with autism can learn to imitate other children, which is a developmentally appropriate skill, rather than solely imitating adults (Kroeger, Schultz & Newsom, 2006).
- Children with autism tend to relate better to objects than to people. Video modeling may compensate for this social deficit because children do not expect any social contact during video watching, which relieves them of social requirements such as eye contact that may distract them from the observation (Charlop-Christy et al., 2000).
- One of the important aspects contributing to the success of video modeling may be that the video is quite constant in its presentation thereby not confusing the

child with continuous changing of social situations which normally occur in real life and are usually quite distractive to children with Autistic Spectrum Disorder.

1.3. Theory of Mind

In the past, despite the acknowledged importance of providing regular and routine play opportunities for typically developing children, enhancing the play of children with autism has had relatively small role in their education and treatment (Wolfberg, 1999, as cited in Thomas & Smith, 2004). Video modeling is a very effective way of teaching these children. In our research we want to take advantage of video to teach the skills of symbolic play to the children and also use the Scripted Symbolic Observation Instrument scale (henceforth SSOI) to assess and adjust the process of development.

By using video modeling together with the SSOI as a guide for development, we hope to take the children's play from functional level to a stage, where the focus of play is outside of the child, playing is independent from context and where unusual themes, organized in long strings of activities, are played out.

We will take the research further by also investigating the relationship between the intervention and Theory of Mind.

According to Westby (1991) Theory of Mind (ToM) develops along with the acquisition of symbolic play skills. Charman et al. (2000) found, that the ToM ability in children with autism is related to language ability, joint attention and impaired imitation. One of the hypothesis of our research is that the ToM skills will improve as a result of the acquisition of symbolic play skills. This might happen through the development of the three previously mentioned aspects: the development of verbal skills, imitation and joint attention. As the intervention improves the children's verbal skills and the video model triggers imitation, there could be an improvement in the ToM skills.

2. Method

2.1 Participants

Our participants were three boys from a special day care center in Haarlem, Netherlands and two boys from Tartu, Estonia. For this report, they are given pseudonyms.

Filip was 5,8 years old and diagnosed with classical autism. Peter was 5,6 years old and diagnosed with Pervasive Developmental Disorder - NOS. The third boy from Netherlands was Sabastian, 5,4 years old, and diagnosed also with classical autism. The boys were selected by the head of the treatment of the autism division for the video modeling training, because they did not show age appropriate (pretend) play, despite the therapies they received.

The first boy from Estonia was Arthur, 5,5 years old and diagnosed with Pervasive Developmental Disorder - NOS. The second boy was Kaur, 5,4 years old and diagnosed with Pervasive Developmental Disorder. They both attended a kindergarten in Tartu, which is specialized on disabilities. For them the teaching took place during their rehabilitation treatment.

All the Dutch boys were very verbal, good in imitating, had an ability to sit still and pay attention. They were also able to communicate their needs.
Estonian boy Kaur was rather verbal, good in imitating, had an ability to sit still, pay attention, and communicate his needs. Arthur on the other hand was rather nonverbal and was deficient in other previously mentioned qualities.

Before intervention the therapist obtained a written informed consent from the parents. A good contact between the therapist and the children was formed before the beginning of the experiment. There had been no prior intervention concerning playing.

2.2 Setting and materials

All sessions were conducted in a small testing room to control for variables such as noise and visual distracters. The room contained a small child-size table, two child-size chairs and a box with the experiment material. The play materials were placed out of the child's sight, so that it wouldn't be distracted by toys not used at the moment. The video model was presented to the child from a laptop computer, behind that was a video camera, recording the child's actions. All sessions were videotaped for later scoring. The sessions took place about twice a week per child.

Our intervention required following material:

1) eight sets of toys and eight sets of similar looking toys.
   1.1 set one: a comb
   1.2 set two: a bear, a comb, a cup, a spoon, a plate
   1.3 set three: a bed, a mattress, a pillow, a blanket, a doll, doll's clothes
   1.4 set four: a table, a chair, a tablecloth, a doll, a cupboard, a plate, a spoon
   1.5 set five: a tractor with removable trailer and open cabin, a doll, five building blocks
   1.6 set six: a bed, a mattress, a pillow, a blanket, a doll, doll's clothes, a bathtub, a toilet, a towel
   1.7 set seven: a table, two chairs, a tablecloth, two dolls, a cupboard, a plate, a spoon
   1.8 set eight: a cup, a stick

2) nine movie scenes (video models for each set plus one, where toys were not acquired)

3) a laptop computer

4) video camera to record the child's actions

2.3 Video production

Videos of the games were produced by the participants of the research team with a digital video camera and were shown on a laptop computer. The videos showed a peer performing desired actions with toys and commenting on the activities. The camera had zoomed in the child and the activity, so that only the desired stimulus could be seen.

The video shows a peer, matching in age and gender, who was engaged in symbolic play according to the categories, toys and scenes described in the SSOI The play script includes 9 scenes and 8 play sets. In the last scene, categories S VIIIa and S VIIIb require the child to think of situations it has neither participated in nor observed, and where the child plays with other children. Categories PS Ia to PS II constitute presymbolic actions and are not addressed explicitly in the intervention, because most of them are implicitly included in the other categories and also the acquisition of these actions is not the goal of current intervention.

2.4 Training schedule

In the experiment we had two sessions per week per child. Every third session, after two training sessions, was a control session. During the training session, the therapist showed the children three video scenes and asked the children to play. All sessions were always conducted by the same therapist.

2.5 Experimental design

Before the beginning of the intervention we assessed the perspective taking skills of the children using seven different perspective taking tasks, which measured emotional, visual and cognitive perspective taking skills. These tasks were done only with Dutch boys, due to the verbal demands of the tasks.

Prior to the intervention, baseline level of symbolic play was assessed, according to the SSOI. One by one 8 play sets were handed to the child and removed, when the child showed signs of tiredness or started to repeat its actions. All the actions and verbal behavior were videotaped and later scored (based on pass or fail) according to the SSOI to estimate the symbolic play Age Equivalent (AE) of the child.

When the child's baseline level of skills was determined, we started with the video modeling intervention. It consisted of training and control sessions, a control session after every two training sessions. When, for example, the child's maximum level of symbolic play Age Equivalent in baseline was 2 years (or category S III) we would start from that level. We would show the child a video scene 3 (which equals the AE 2 years, which the child has acquired) and 2 Age Equivalents above its level. So, in this example we would show the child in first two training sessions the scenes 3, 4 and 5. After showing each scene in a video model, the child is asked to play. When the child gets bored and keeps repeating the actions, the toys are removed and next set is presented. We show two succeeding levels above the child's current level in order to challenge the child to improve above its actual functioning, as in Vygotsky's theory of zone of proximal development.

In the control sessions the video modeling is not used. The child is given the 3 sets of toys it was playing with in the training sessions (in our example 3, 4 and 5) and then 3 sets of toys from consecutive scenes (6, 7 and 8), to examine the effect of video modeling on toys the child has not been taught to play with. To assess the generalization of newly learned skills, we will present also 3 sets of toys, which are similar looking to the ones child has been taught to play with during the training sessions (3, 4 and 5).

Training sessions:

video model A (scene 3) → child is given set A and is asked to play
video model B (scene 4) → child is given set B and is asked to play
video model C (scene 5) → child is given set C and is asked to play

Control sessions:

I part

1) Child is given set A (scene 3) and is asked to play
2) Child is given set B (scene 4) and is asked to play
3) Child is given set C (scene 5) and is asked to play

II part

Child is given set D (scene 6) and is asked to play
Child is given set E (scene 7) and is asked to play
Child is given set F (scene 8) and is asked to play

III part

Child is given set A' (scene 3) and is asked to play
Child is given set B' (scene 4) and is asked to play
Child is given set C' (scene 5) and is asked to play

By using this experimental design we can measure the following:

- The child's skills, when it has been shown a video model (training sessions)
- The child's skills on playing with the same toys, when it hasn't been shown the video (control session part I)
- The effect of video modeling intervention on playing with toys the child has not been taught to play with (control session part II)
- The effect of video modeling intervention on playing with toys that look very similar to the toys the child has been taught to play with in training sessions (control session part III) – generalization across materials.

The follow-up took place 4 weeks after the scheduled end of the intervention. It took place in the same room, where the sessions had been taking place. The arrangement of the session was exactly the same as in the baseline session. The perspective taking tasks were also assessed.

2.6 Measurement techniques

2.6.1. Variables

The dependent variable: The level of symbolic play displayed by the participant (the levels of symbolic play are described in detail below) and the level of perspective taking.

The independent variable: The video modeling intervention.

The child's action and verbal behavior were recorded with a camera in every training and control session. This tape was later watched and assessed by the therapist, co-researcher and a supervisor during a discussion. The tape was scored according to the SSOI on pass fail basis.

When all the actions have been scored, the Age Equivalent (AE) can be determined. It indicates to what age the play-niveau of the child corresponds to. By comparing the Age Equivalent to the chronological age of the child, it can be determined if/and to what extent there is a delay in the development of symbolic play. The Age Equivalent will be determined by examining which main categories (e.g. SI, SII, SIII) the child has mastered. If, for instance, a child scores all subcategories through SIII, then an AE of 2 years will be determined. The same Age Equivalent will be determined when the child scores a few of the subcategories above that. This is viewed as a sign of a developing play behavior of a higher niveau. This will not be included in the determining of AE, but should be addressed specifically in the discussion (Hamberg & Kunkeler, 1996). Eight play sets will be presented according to the SSOI, and the number of categories introduced to the child will be in accordance with the SSOI categories introduced below.

2.6.2 Description of SSOI

SSOI (Scripted Symbolic Observation Instrument) is a scale used for the interpretation and estimation of symbolic play in children. The SSOI is a translation and adaptation of a play observation scale by Westby (1991). This scale gives a detailed description of

symbolic play from 18 months through 5 years, depicting different dimensions of symbolic play (Hamberg & Kunkeler, 1996). According to Westby, symbolic play is based on 4 dimensions: decentralisation, decontextualization, organization (integration) and "thematic content". When symbolic play first appears it is mainly directed towards the child itself, e.g. the child pretends to feed themselves. Gradually, the attention shifts to the other (decentralisation), e.g. the child not only pretends to feed itself but also the doll. Later on, the doll is no longer just a passive recipient but also an active partner in the play. The second dimension, decontextualization, implies that the child is increasingly less dependent on the direct context (persons, situations and objects). This development normally happens around 3 – 3 ½ yrs. A child, for instance, pretends to brush its teeth. At first a toothbrush is needed, later on, a stick or a finger is enough and later still the child pretends to brush the teeth with the right movements without any object at all. Furthermore, children are increasingly able to integrate their play handlings into coordinated behavior sequences which Westby refers to as organization or integration. The fourth dimension is thematic content. In the development of symbolic play the shift in themes occurs. At first, children play themes that they themselves participate in on a regular basis (e.g. sleeping, eating), later they play out themes that are less frequent (e.g. shopping, going to the doctor), and still later themes they have only observed (e.g. driving a car) and eventually themes they have never experienced (pure fantasy) (Hamberg & Kunkeler, 1996).

Table 1. Description of SSOI categories and corresponding video tape scenes

Age	Category	Description
8 – 12 months	1. PS Ia	The child examines the moving parts of the toy.
	2. PS Ib	The child hits, whirls or throws the toy.
13 – 17 months	3. PS II	The child uses familiar objects in correct way, e.g. makes the doll walk
17 – 19 months	4. S Ia	Short isolated schemas, e.g. the child pretends to sleep or drink. The child performs actions on itself, without use of any object.
	5. S Ib	The handling of an object is directed at the child itself, not at another object or person, e.g. the child combs its hair with a comb.
19 – 22 months	6. S IIa	Combinations of short isolated schemas, e.g. the child puts a cup on a saucer.

	7. S IIb	The handling of an object is directed at a doll or another person, e.g. the child combs the hair of the doll; the child feeds the doll with a spoon. The doll plays a passive role.
	8. S IIc	The same action is directed towards more than one object or a person, who play passive role, e.g. the child feeds the doll, then itself and the mother.
2 years	9. S III	Elaborated single schemas. Daily activities like cooking, eating and sleeping are played out in detail, e.g. the child makes the bed, puts the doll in bed and tucks it in.
2 ½ years	10. S IVa	Episode sequences. More rare situations are played out, e.g. buying groceries, going to the doctor. The sequence of actions is not planned in advance (one handling calls for another).
	11. S IVb	Child talks to the doll; but not yet acting out a special role. This talk is usually in the form of single observations such as "drink your milk", "go to sleep".
3 years	12. S Va	The child plays a specific role, e.g. the mother or a doctor, without making use of a doll. The child acts like that character, often accompanied by voice changing.
	13. S Vb	The child makes a combination of two or more schemas with a certain connection between them. One action follows another, e.g. laying the table, cooking, putting dinner on table, eating, cleaning the table.
3 – 3 ½ years	14. S VIa	The doll acquires an active role in the game. The child speaks for the doll, often in the I-form, accompanied by voice changes.
	15. S VIb	Object substitution: The child uses an object as a representation of something else, e.g. a stick is a spoon; a chair is a car.
	16. S VIc	Situations the child has never participated in, only observed are played out, e.g. police, fireman.
3 ½ - 4 years	17. S VIIa	The play schemas are planned in advance by the child. Language is used to create a play situation (e.g. let's pretend this is a dog). The child hands out roles in a group play and searches for the right material.
	18. S VIIb	The child or the doll has more than one role, e.g. a father and a fireman.
5 years	19. S VIIIa 20. S VIIIb	The child thinks of situations it has neither participated in nor observed (e.g. astronaut, spaceship). It plans various successions and realizes what is needed (objects and persons) The child plays with other children, where role distribution and play is purposeful.

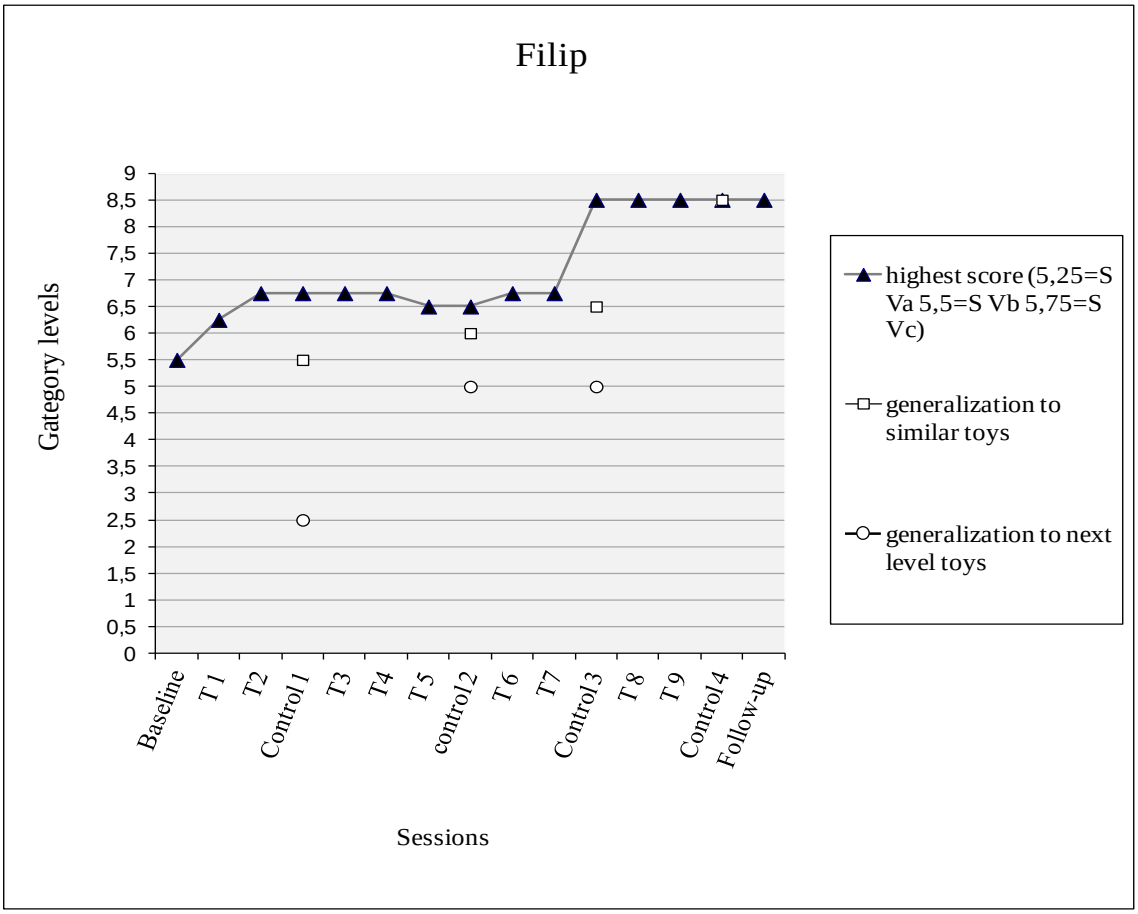
2.6.3. Inter-observer Agreement

We collected inter-observer agreement (IOA) in Estonia. We calculated IOA for all the control sessions. For all the control sessions the agreement is 87%.

3. Results

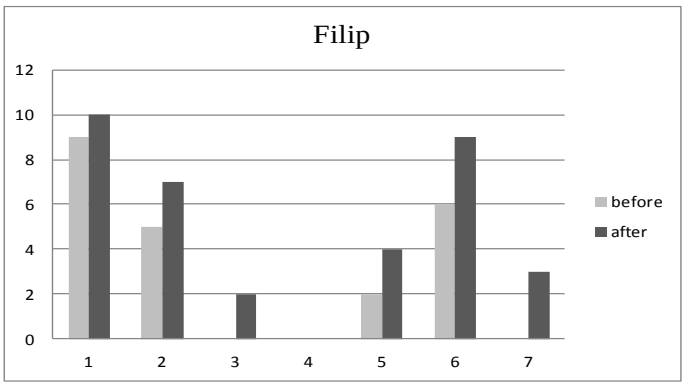
3.1 Results for Filip

Results for the child Filip (5,8 y.o.) can be seen in Graph 1. During the baseline the child showed very good play behavior and the highest score he got was S Vb, which equals an Age Equivalent of 3 years. The child was able to make a combination of two or more schemas with a clear connection between them, one action following another. In the subsequent training sessions the child's skills grew rapidly and he showed a new level of development in the first control session, playing games, he had never participated in. By the end of the intervention, the child had reached the highest level possible, which equals to an Age Equivalent (AE) of 5 years. In the last sessions, the child played out situations, he had never participated in before and also played together with a therapist. Filip also showed a rather good generalization to similar looking toys. Generalization to next level toys was low, probably due to the fact that the toy set was comprised only one cup, so that probably it wasn't a good enough trigger to produce higher scores.



Graph 1. Results for Filip

Before and after the intervention, ToM skills were measured. The results for Filip are displayed in Graph 1.1. He showed an increase in perspective taking skills in six out of seven tasks. The increase took place in sets where he already had a significant score (set 1, 2, 5, and 6), but also where he had a zero score (sets 3 and 7) at the pre-intervention measurement.

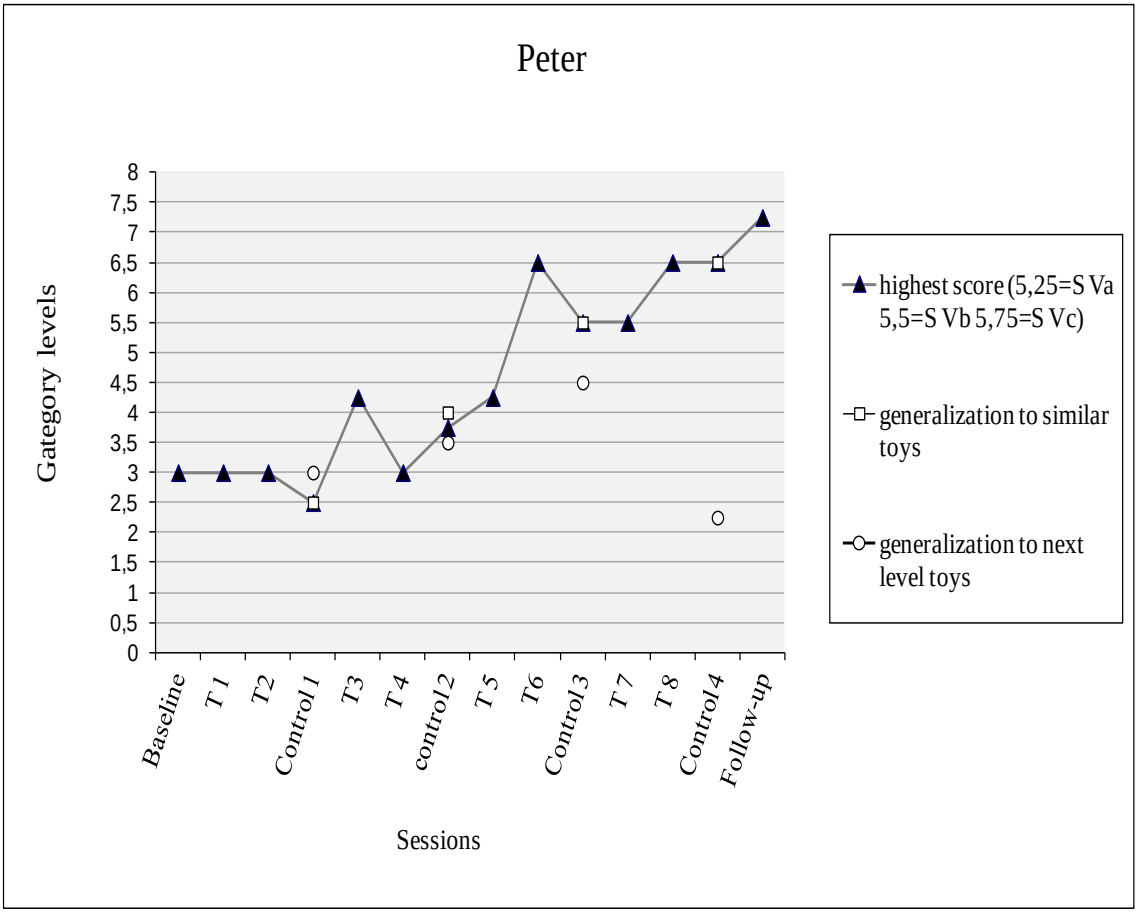


Graph 1.1. Theory of Mind results for Filip

3.2 Results for Peter

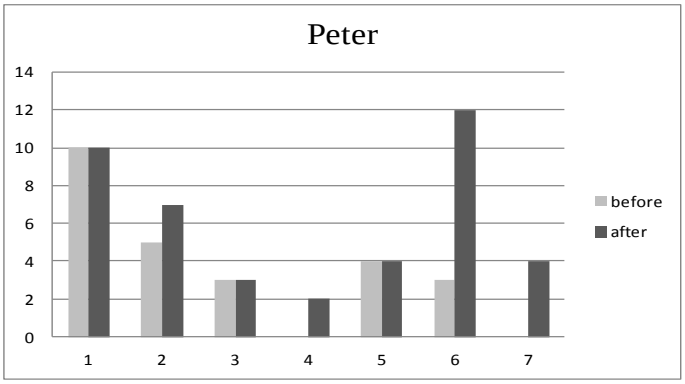
In the baseline assessment Peter (5,6 y.o.) showed a good level of functional play at the level S III, which equals the AE of 2 years. This level is described by elaborated single schemas, which are not yet connected to a longer string of play activities. After the beginning of the intervention, the results started to increase steadily, reaching the level S Vb in the 3rd control session. At the end of therapy, the child was capable of playing on the level

S VIb, which equals the AE of 3 ½ years and is described by child engaging actively in the play, using I-form when talking and object substitution, where an object represents something else. Peter continually showed very good level of generalization and had no problem with applying the knowledge gained in training sessions to similar looking toys. In addition to that, he was also capable of generalizing the knowledge to new toys that he had never been taught to play with. In the last control session though, the set was comprised only of a cup and probably wasn't triggering enough.



Graph 2. Results for Peter

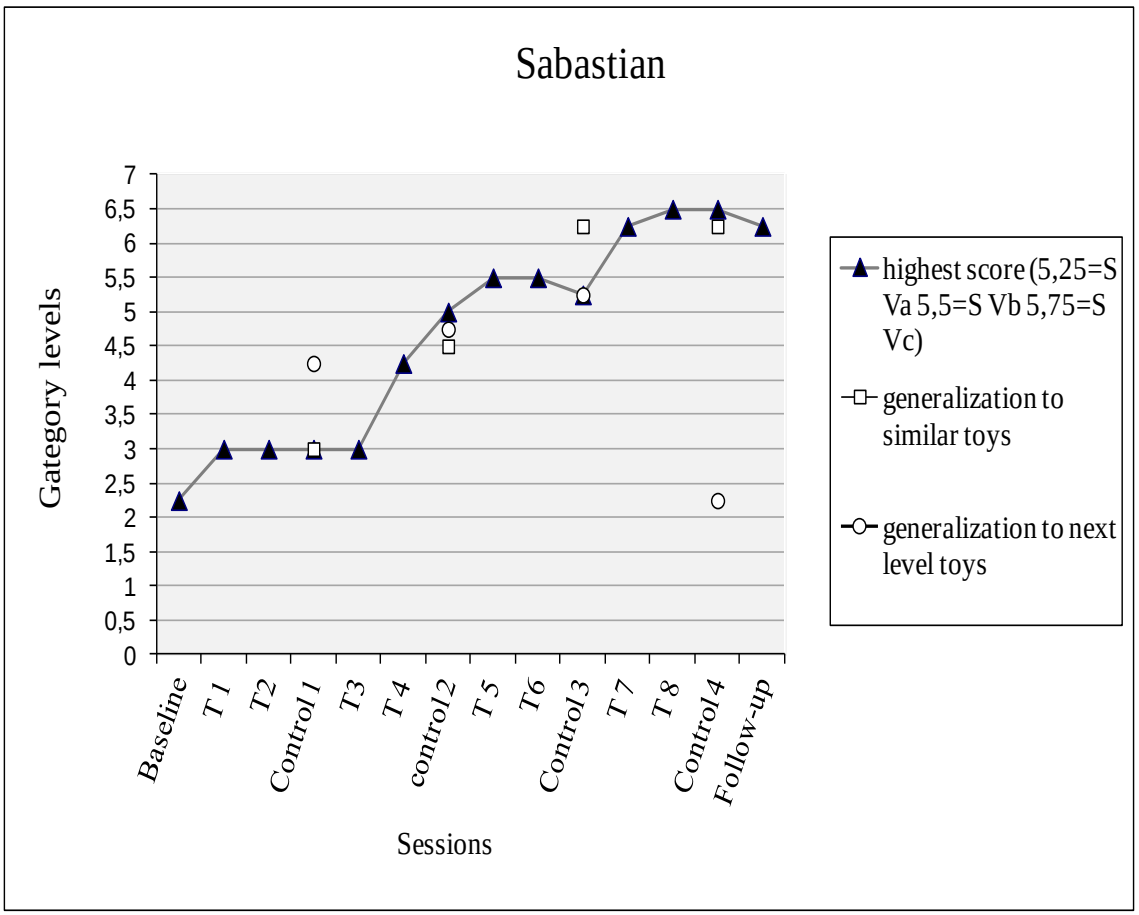
The perspective taking task scores are shown in Graph 2.1 for Peter. He showed an increase in perspective taking skills in four out of six perspective taking tasks. Especially on task 6, a clear growth can be seen.



Graph 2.1. ToM results for Peter

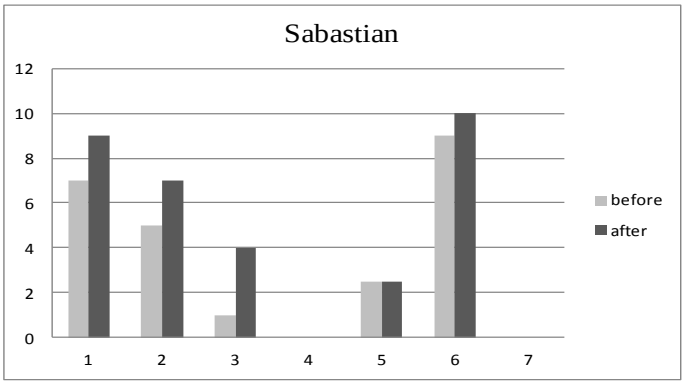
3.3 Results for Sabastian

Results for Sabastian (5,4 y.o.) can be seen on Graph 3. The baseline of the child's play behavior was on functional play level, which is the common level for a child with autism. The AE was only 19 months, described by combinations of short isolated schemas. During the intervention there was a stable growth in skills, reaching level S VIb at the end. At the termination of the intervention, the child was capable of playing with the toys provided and AE level of almost 3 ½ years. The play in the end of the intervention was characterized by the player acquiring an active role in the game as well as using the I-form when talking and object substitution. Similarly to Peter, Sabastian also could easily apply the knowledge learned to similar looking toys as well as toys he had never been taught to play with. Analogously, Sebastian didn't show generalization of skills in the set, where there was only a cup provided.



Graph 3. Results for Sabastian

Before and after intervention perspective taking task scores for Sabastian can be seen in graph 3.1. A growth took place in 4 out of 7 tasks.

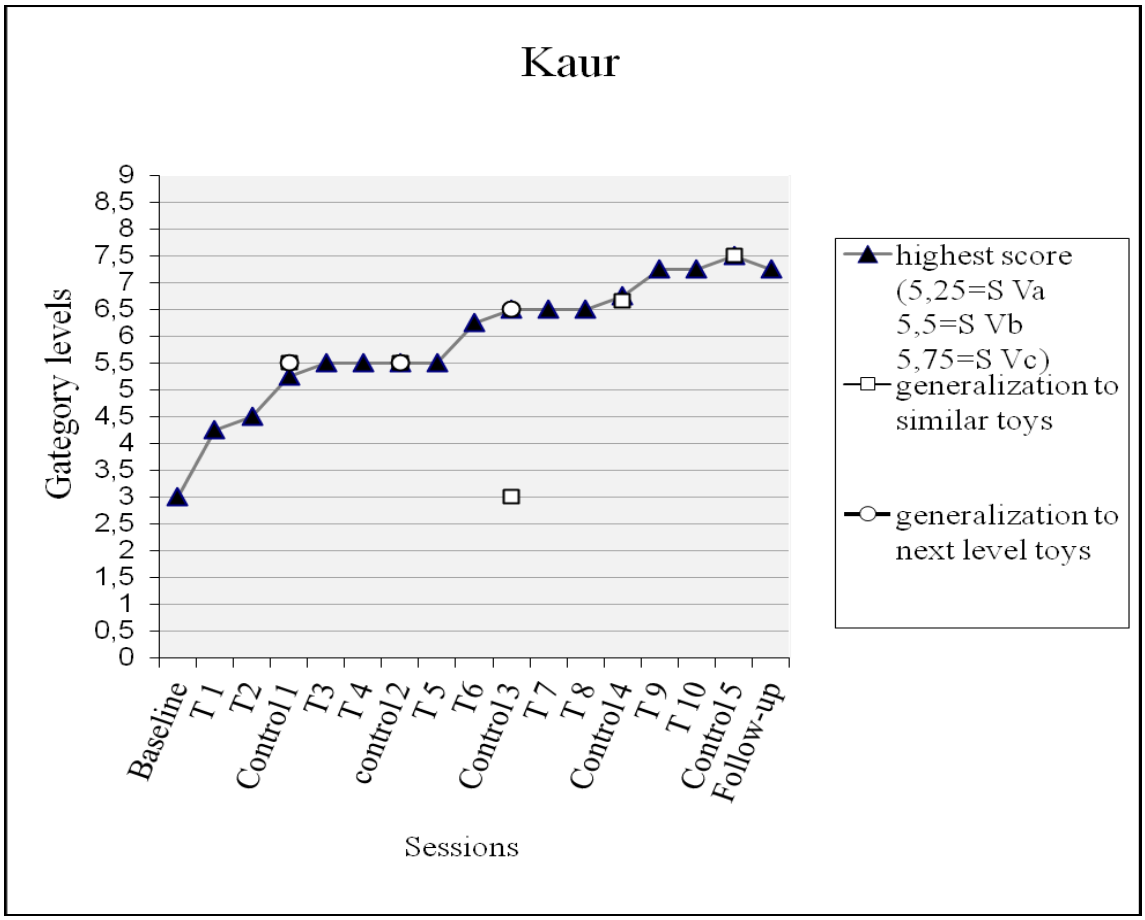


Graph 3.1. ToM results for Sabastian

In addition to the generalizations and new developments occurring during the sessions for these three boys, there was some feedback from people, who work with them on a daily bases. They had noticed remarkable improvement in the verbal skills of the children, supposedly due to our intervention. In addition, one child was observed to be showing functional play in a normal group setting, which was new to his repertoire. The latter shows a generalization across materials and settings.

3.4 Results for Kaur.

Results for Kaur (5,4 y.o.) can be seen on Graph 4. In the beginning Kaur's play skills were clearly on functional level, showing the level of play expected of a 2 year old. He used toys appropriately, but quickly ran out of ideas of how to play further and started to repeat himself. After the beginning of the intervention, Kaur quickly learned new skills and started to use the toys in new ways, creating longer strings of schemes. There was a period, where Kaur stayed on the level S Via. That occurred due to the nature of the level, which requires the child to be very verbal and use the "I-form". That was very difficult for Kaur, as he had never learned to use the different forms, he was also much less verbal than the Dutch boys in general. At the end of the therapy he showed play behaviors, which are characterized by the use of language to create play scenarios, using the same doll for different roles and playing out situations the child had never participated in. This was topped by prevalent use of object substitution.



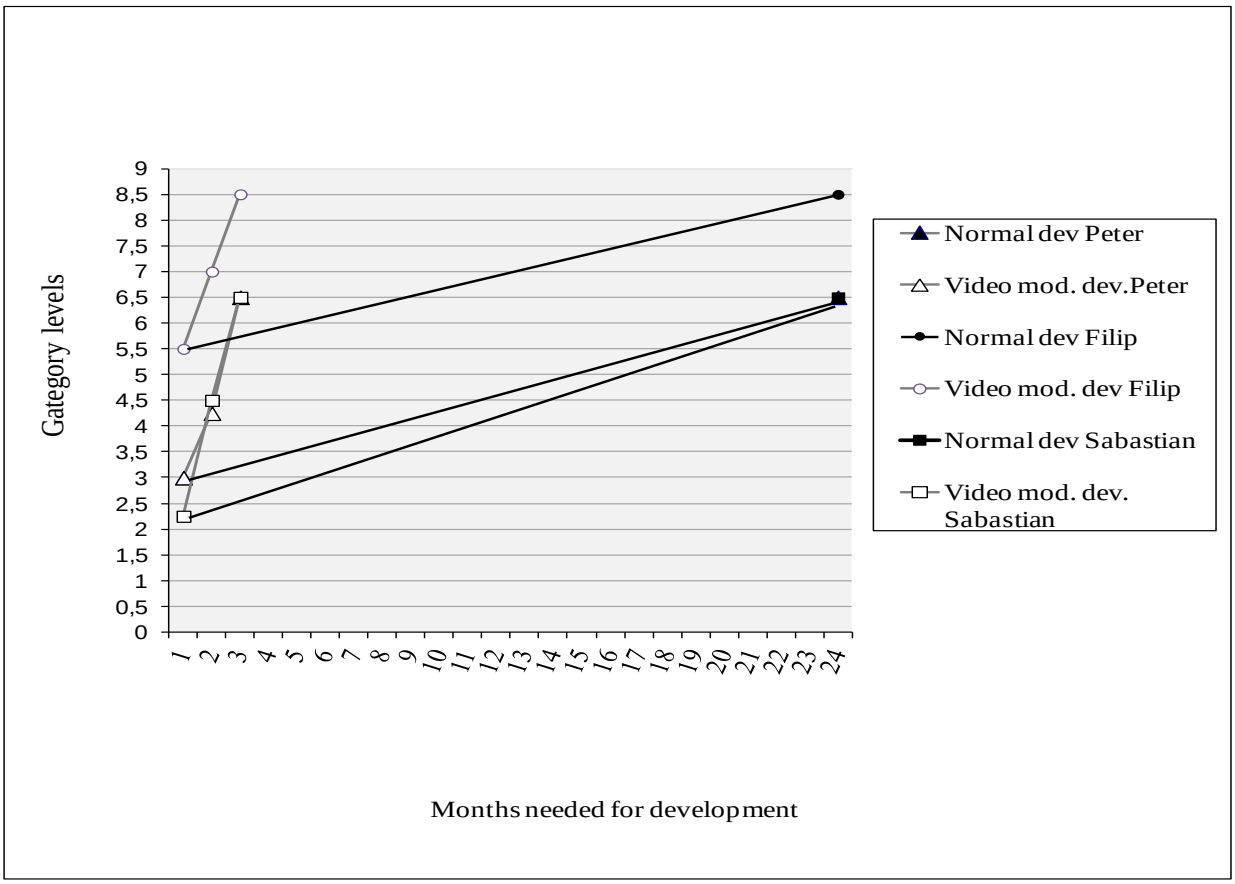
Graph 4. Results for Kaur.

In addition to previous developments we can bring out that Kaur developed very good verbal skills during his play and also started to use the I-form in his everyday environment. On top of that he has showed some self-induced symbolic-interactive play at home with his mother and father – the themes of which seem to been taken from TV-cartoons. Once more this indicates to a very good generalization of skills to new objects and environments and also copying the play behavior of a natural video model from the child's environment.

From the graphs of all the boys we can clearly see the maintenance of skills in the follow-up. This shows that the acquired skills have stayed on the stable level 1 month after the intervention.

In Estonia, before taking Kaur, we had chosen another boy Arthur (5,5 y.o.), to participate in the experiment. We were able to carry through 4 sessions with him. Unfortunately he was below highly developed autism, had very little speech and had problems with hyperactivity and attention. He had shown some functional play in his home environment, but unfortunately he was rather stressed in a new environment and appeared unfocused most of the time. From the experience with Arthur we learned that this type of video modeling treatment is appropriate for children with high-functioning autism, who are verbal, good in imitating, have an ability to sit still, pay attention, and communicate their needs.

The speed of skills' acquisition is clearly demonstrated in the Graph 4, where one can see, that all the children mastered 6 category levels within just 3 months in average. In normal development this takes up to 24 months. Until the beginning of the intervention the children had mastered approximately 11 categories in about 5,5 years, while our intervention took them significantly closer to their age appropriate level of development in just three months.



Graph 4. The speed of development of play skills of autistic children in our intervention as compared to expected normal development.

4. Discussion

In the baseline the children's play was on functional level. During our intervention they started to develop symbolic play skills. Our measurement design demonstrated fast acquisition of skills, taught via video modeling as well as good level of generalization to similar looking toys and toys, they had not been taught to play with. The employment of SSOI offered an opportunity to have a protocolized model tape and assessment, allowing to adapt the intervention to the level of functioning of the child. Application of SSOI to create training tasks and to assess training results is original approach in the field of teaching play skills via video modeling, and as compared to former research, brings the study of acquisition of complex skills to the next, more precise and measurable level.

Apart from the improvement in pretend play, skills in perspective taking grew significantly during the video modeling training, which suggests an increase in ToM. This supports previous research where a relation between ToM, autism and the development of pretend play was found (Charman et al, 2000).

Looking at the speed of the improvement of the children's skills in the experiment, one may ask, whether the children really are showing the symbolic play or is it just a copying of the video model? The answer lies in our experimental design. In the training sessions the children are actually expected to copy the behavior shown in the video, but during the control sessions the children are not shown the video and are then asked to play. This shows whether they have acquired the play skills taught previously. If someone would yet try to explain such play as copying the well-memorized model, another task in our design gives clear contrary evidence: in part III of every control session the children are provided with another, similar sets of toys to measure the generalization across materials. Furthermore, our assessment instrument, the SSOI, is sensitive towards new developments, taking into account, whether the child has developed new play behaviours and verbalizations on its own.

Our results strongly confirm previous findings on the strengths of video modeling in autistic population. Firstly, at the initial level of play behavior of the children in our research we see skills described by Wolfberg (1999) – play is characterized by repetitions and lack of imagination. Our baseline measurements support her results, confirming that without specific teaching, these children are unlikely to engage in functionally appropriate play.

Another major result concurred with what Sherer et al. (2001) brought out in their study – video modeling reduces reliance on social interaction and the necessity for the presence of a therapist to promote learning. This is truly important in today's world, where video games, videos, TV-s and advertisements are widespread and accessible and therefore provide great possibilities for these children.

Thirdly, this research has clearly supported the previous findings by Charlop-Christy (2000), showing that the novelty of this therapy is highly motivating these children. Furthermore due to the small demands for social interaction, the children have more resources and higher motivation to learn new skills and generalize their use in the real world.

Last, but not least, our experimental style measures generalization to similar looking toys, but also to toys, the child has never played with. In addition we have found that children easily generalized their verbal and behavioral skills to new environments outside of therapy setting. This altogether supports the previous findings of Charlop-Christy et al. (2000) on the superiority of this mode of learning over *in-vivo*, in terms of generalization.

Still, some conclusions for future research can be made. First of all, the video clips could be longer and contain more scenes of given level, so that the child would acquire wider range of skills on that level of development. In the current research scene 8 consisted of only one cup and a stick, which weren't enough of a trigger for all the boys in order to start playing in symbolic way. This could be avoided by strengthening the base in previous levels and widening the selection of toys in current one.

In teaching symbolic play skills to autistic children, it is important to bear their general developmental level in mind. It is important to investigate their different skills, for example how verbal they are, are they able to sit still and pay attention, or on what level they use toys. When these skills are deficient, it can become a serious obstacle to acquiring the play skills, as seen in one participant in Estonia.

Based on current and previous research results, we encourage therapists to use video modeling in addition to *in-vivo* modeling in their everyday practice due to the aforementioned benefits. Video modeling is especially useful in a situations, where technological advancements provide multiple possibilities for good quality video production and use for nearly everyone, the method's benefits significantly exceed the costs.

5. Conclusion

We found that video modeling intervention led to considerable increase in both motor and verbal play responses. All the children exhibited rapid acquisition of verbalizations and play actions, improved it during the intervention and maintained at follow-up.

The graphs clearly demonstrate that our intervention was highly effective, as can be inferred from a pronounced difference between baseline and intervention and also from the increase during intervention phase in all performances. As the comparison between the baseline and intervention shows, the improvement in performance is due to our intervention, not to random or automatically evolving developmental processes and extraneous, unrelated variables.

The present findings indicate that video modeling can be effective and efficient teaching medium to teach necessary skills for playing to children with autism. Implementation of such a time-efficient technique holds great promise in the treatment of children with autism, especially in the light of recent advances in video and computer technology.

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