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An evaluation of the Cognitive Objects Play Intervention for children  
with profound multiple disabilities at a children's Home and three  
daycare centers in South Africa

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## **Abstract**

**Introduction:** This research evaluates the ‘Cognitive Objects Play Intervention’ (COPI) in Sizanani Children’s Home and three daycare centers in Bronkhorstspruit in South Africa. This therapy intends to improve the ‘Cognitive Play Performance’ (CPP) of children with multiple disabilities. The children in the Home received this therapy before, whereas for the daycare children it was new. **Method:** Thirty-nine children were selected to assess the effect of COPI. For the Home group (N=20) a within pretest-posttest design with matched control groups was used. For the daycare group (N=19) a single pretest-posttest design was used. All participants received ten therapy sessions within a period of five weeks. Progression in CPP was measured by means of the ‘Play Observation Scale’ (POS). **Results:** It seems that the positive results of the previous COPI period were contained, despite a lack of therapy for 15 months, as only non-significant differences were found between POS scores of the last measurement of the earlier study and the first measurement this year. Contrary to the expectations, no additional positive growth in CPP was found for the Home group after ten sessions of COPI in the present study. The daycare group did show the expected progression in CPP. **Discussion:** Results suggest that effects of COPI still exist after a period without therapy. The difference in findings between the Home and daycare group may indicate that highest progress is made when the therapy is new, and that further growth is more difficult as children come closer to their highest potential. But it may also be that the therapy has to be extended and improved, or that the quality of the trainers should be improved in order to make further progress.

**Keywords:** play therapy; development; disabilities; children

## Samenvatting

**Inleiding:** Dit onderzoek evalueert de ‘Cognitive Objects Play Intervention’ (COPI) in Sizanani Children’s Home en drie dagopvangcentra in Bronkorstspruit in Zuid-Afrika. Deze therapie beoogt de ‘Cognitive Play Performance’ (CPP) te verbeteren van kinderen met een meervoudige handicap. De kinderen in de Home ontvingen deze therapie al eerder, terwijl dit voor de kinderen van de dagopvangcentra een nieuwe therapie betrof. **Methoden:** Er zijn 39 kinderen geselecteerd om de effecten van COPI te meten. Voor de Home groep (N=20) is gebruik gemaakt van een within pretest-posttest design met gematchte controle groepen. Voor de dagopvang groep werd een single pretest-posttest design gebruikt. Alle participanten ontvingen tien therapie sessies binnen een periode van vijf weken. De progressie in CPP is gemeten door het gebruik van de ‘Play Observation Scale’ (POS). **Resultaten:** Het lijkt erop dat de positieve resultaten van de eerdere COPI periode behouden zijn gebleven. In tegenstelling tot de verwachtingen, is er geen extra positieve groei in CPP gevonden voor de Home groep na de 10 COPI sessies in de huidige studie. De dagopvang groep liet wel de verwachte progressie zien in CPP. **Discussie:** De resultaten suggereren dat de effecten van COPI nog steeds bestaan na een periode zonder therapie. Het verschil in bevindingen tussen de Home en dagopvang groep zou kunnen indiceren dat de grootste progressie wordt gemaakt wanneer de therapie nieuw is, en dat verdere groei moeilijker is voor kinderen naarmate zij dichterbij hun hoogste potentieel komen. Het kan ook zijn dat de therapie uitgebreid en verbeterd dient te worden of dat de kwaliteit van de trainers verbeterd dient te worden om verdere progressie te maken.

## **Introduction**

Play is considered as being essential for childhood (Milteer & Ginsburg, 2011). The role of children's play has held particular allure to child developmental and educational research for a number of years. While playing with toys, children learn to understand their surrounding and get a chance to develop cognitions. Therefore, play is required for child development (Brodin, 1999). The instinct to play is natural among healthy children (Singer, Nederend, Penninx, Tajik, and Boom, 2013), but seems to be less developed when children have disabilities (Hsieh, 2008). Children with disabilities have limitations to explore, move, communicate, and interact with the environment and this influences their play interactions. Hence these children need more support to engage in play activities and need more support to improve their play skills than children without disabilities do (Murphy, Callias, and Carr, 1985). The importance of play behavior for children is clearly obvious, but the importance of play behavior for children with disabilities even more. Children with disabilities can show more play behavior in an adapted environment (Brodin, 1999). As a result, children with disabilities need interventions such as play therapy, to overcome their lack of skills to play (Frey & Kaiser, 2010).

One of these interventions considering play therapy is the Cognitive Objects Play Intervention (COPI). This therapy is developed at Utrecht University and implemented by students in Sizanani, a home for children with disabilities in rural South Africa (Flesch, 2011; Velzen & Mathot, 2010, Vos & Westhreenen, 2009). COPI is a structured play therapy intending to improve cognitive functioning through play. The cognitive development that results from this play, should in the end lead to more independent and more adaptive behavior for the disabled children; for example in terms of self-care, communication and social skills. The idea is that these improved skills will increase the quality of children's life. Earlier research indicated positive effects for this therapy (Flesch, 2011; Velzen & Mathot, 2010, Vos & Westhreenen, 2009), but empirical evidence is still limited. Therefore, the focus in this research

will be on further establishing the effects of COPI by using an improved version of the measurement scales, a better research design and a broader group of participants by including daycare children.

COPI is designed according to theories of several developmentalists such as Gibson (1988) and Vygotsky (1978). Gibson (1988) emphasizes the direct perception of affordances offered from the environment. Getting to know affordances of the environment by means of active exploration thus accounts for the basis and growth of cognitive knowledge. Affordances are defined as 'relations between the abilities of organisms and features of the environment' (Chemero, 2003). In the case of disabled children, getting to know affordances is problematic due to their limitations. Therefore more (social) stimulation is required for these children. According to Vygotsky's 'sociocultural learning method' (1978), relationships and interactions with other people are important in the development of thinking processes. Vygotsky also saw an important role for adults in extending children's learning beyond areas in which they are independently capable. He used the term 'Zone of Proximal Development' to describe the most effective way to learn; children should do tasks of which they are not capable of doing alone but which are simple enough to do with the help of an adult or more skilled peers (Wass & Golding, 2014). To help the child complete their tasks on their own, the sensitive teacher creates opportunities for the child, which Oakley (2004) identifies as 'Sensitive assistance'. The teacher is assisting the child in learning how to solve problems and complete tasks by gradually letting the child take control in the performance of a task (Stremmel & Fu, 1993). This implies that teaching is only effective when the child is encouraged to accomplish a task which is just above the level of what a child independently could accomplish (Stremmel & Fu, 1993). To promote playing amongst children in COPI, sensitive assistance is translated into three steps. The first step consist of verbal encouragement and nodding to be able to perform the task. In the second step the child gets a demonstration of an appropriate play behavior (modeling). In

the third step the support consists of hand-over-hand physical help by the teacher. The more independence and initiative a child demonstrates, the less assistance will be given (Flesch, 2011).

COPI intends to improve play behavior in children with disabilities by giving structured play therapy sessions. During the present study, children played with selected toys in ten therapy sessions. The cognitive level of independent playing is measured by the 'Play Observation Scale' (POS), which is developed and extended by previous master students (Flesch, 2011; Velzen & Mathot, 2010, Vos & Westhreenen, 2009). During the assessment by means of the POS, children will be offered various unfamiliar toys in a free play session. By using unfamiliar toys the improvement in independent playing is measured while playing with other toys than used in the therapy sessions and therefore controlled for a training effect. During the intervention sessions itself, it is desired that an improvement in cognitive play performance will be accompanied by a decrease of assistance given during the therapy.

The POS is based on stages of play, as developed by Smilansky (1986). The first stage is 'functional play': where infants use their body's (sucking and touching) and progress to other physical activities such as holding a block. The second stage is 'constructive play': which occurs when children begin to manipulate objects, for example making a tower with blocks. The last stage is: 'dramatic play': in this stage children imitate the world around them through their role-play with objects. For example: Building a house with blocks and imagine they are living in that house. Flesch (2011) found positive effects in CPP by POS measurements as well in independent playing during the therapy. Therefore it was proven that children showed an increase in independent playing during the therapy and are able to play with toys at a higher level after the implementation of COPI.

COPI was implemented in Sizanani Children's Home, situated in Bronkhorstspruit, in rural South Africa. Sizanani Children's Home is a residential facility for children with

profound multiple disabilities. Master students Vos & Westrhenen (2009) have introduced the play intervention and gave the therapy by themselves. During the research of Flesch in 2011 the therapy has been conducted by the childcare workers themselves. To realize this, Flesch (2011) developed a training for the childcare workers and wrote a protocol for the therapy. By using a single-case-experimental design, Flesch (2011) found higher levels on CPP after the implementation of COPI, in which each child received two play-therapy sessions per week in period of six weeks. The present study will again evaluate the effectiveness of COPI on improving cognitive play performances in the Home, but will use a better design with matched control groups. For the Home group a Within Pretest-posttest design with a matched control group is used. The control group followed the usual daily program at Sizanani, e.g. going to school, or following the Conductive Education (CE) program (Mathot, Velzen, 2010). The CE program intends to create more independency in daily life by focusing on motor functional skills. CPP was observed before the therapy starts and after the therapy sessions have ended. Additionally, the therapy will be introduced in three daycare centers in the area of Sizanani Children's Home. These daycare centers have been established and managed by Sizanani in the past years. For the daycare group a single pre-post test design is used since the implementation of COPI in daycare centers will be labour-intensive for researchers. The design used for the daycare group could give an indication of the effectiveness of the intervention for the daycare group.

In contrast to prior research of Flesch (2011), the effectiveness of the therapy will be compared to a control group and therefore an effect size can be calculated. Moreover, the possibility that effects in POS measurements are caused by training effects as a result of the POS measurements can be precluded. As a result of this, the current study is able to give more support to the effectiveness of the therapy. After finding the positive results in 2011, the therapy has not been given in Sizanani Children's Home for fifteen months. It is interesting to

see if there are still effects detectable in the children of Sizanani Children's Home after this period. Of course, long-term effects are of major importance. After all, the cognitive development that arises from the independent playing, should eventually lead to more independent behavior of these children.

In summary, this research will measure to what extent the effects of COPI are still visible after 15 months without COPI. The expectation is that children are at a lower level of CPP as they were in the last measurement of (Flesch, 2011), since the lack of training in the period without therapy. The second question relates to what extent the effects of COPI increase after a renewed start of COPI. The expectation is, based on the positive results in previous years of COPI, that the renewed implementation of COPI will again evoke higher levels of cognitive play performance than before the intervention, as measured on the scale of Smilansky (1986). Additionally, the effects of COPI in the daycare centers will be measured. The expectation is that the implementation of COPI in the daycare centers will evoke higher levels of cognitive play performance than before the intervention. The fourth question relates to the difference between the effects of COPI between the Home Group and the daycare group. The expectation is that COPI will evoke higher levels in CPP for both groups.

## **Method**

### **Participants**

There were 39 participants selected by the manager of the Home. It was expected that those children would take benefit of COPI because they had a basic awareness of the environment and were able to show reactions to their environment. Moreover, the children had to be able to move at least one arm and hand. 20 participants were in the Home group (Group 1) and 19 were in the daycare group (Group 2). The Home group consists of 15 children living in the Home and 5 children living in the Group home, a part of Sizanani situated near one of the



daycare centers. The children of the daycare group are living at home with their caregivers and visit the daycare centers five days a week.

**Home children.** In total there were 13 boys (65%) and 7 girls (35%) participating, with an age range from 6 to 33 ( $M = 21.21$ ,  $SD = 7.22$ ). Many of these participants of the Group home and Home were diagnosed with cerebral palsy (40%) and/or were mentally retarded (35%). The rest of the group had different disabilities such as hydrocephalia and severe learning difficulties. Participants did not all have a proper diagnosis, therefore these statistics have to be interpreted carefully.

**Children from daycare centers.** Nineteen children from the daycare centers participated in the COPI program this year. There were 12 boys (63.16 %) and 7 girls (36.84 %) with an age range from 3 to 23 ( $M = 10.37$ ,  $SD = 4.79$ ). Most children of the daycare centers were diagnosed with Learning disorder (26%) or were intellectually challenged (26%). Others had Down syndrome (32%) or cerebral palsy (16%).

## **Instruments**

**Play Observation Scale.** To measure the level of cognitive play abilities of the participants the POS has been used. The scale consists of eight toys, eliciting different levels of cognitive play as shown in table 1.

**Table 1.**

Overview of toys.

	<b>Toy</b>	<b>Level of cognitive play</b>
1	ball	functional play
2	xylophone	functional & constructive play
3	car	functional & constructional play & drama play
4	wooden blocks	functional & constructional play & drama play
5	puzzle box	functional & constructional play
6	matching game	functional & constructional play
7	puzzle	functional & constructional play
8	farm	functional & constructional play & drama play

*Adjustments of the POS.* To measure the effectiveness of this year's COPI an improved version of the POS was used (see appendix B for an overview of the POS). The adjustments included a shorter assessing period (two minutes playing per toy instead of three) and changes in the toys used for the POS. Some of the toys used by Flesch (2011) were not available this year. Therefore different, but comparable toys were used for POS measurements. For instance the original puzzle was replaced by another one.

*Reliabilities.* In order to be able to make a valid assessment of the longitudinal effects of COPI the version of Flesch (2011) has been used for this question. The toy 'animals' used by Flesch (2011) was not taken into account in the longitudinal assessment since the inter reliability of these toys was too low so the longitudinal analysis was done based on 8 of the 9 toys Flesch used in 2011. The inter observer reliability for the version of the POS of Flesch (2011) was calculated by scoring 44 (at least 2 and maximum 10 of each toy) videos of each toy and was found to be moderate (Cohen's  $\kappa = .341$ ).

To be able to assess the amount of drama play more accurately a new toy 'the Farm' has been introduced to the new version of the POS. The inter observer reliability was found to be high (Cohen's  $\kappa = .88$ ). Additionally a new toy 'matching game' was introduced. The inter observer reliability was found to be perfect (Cohen's  $\kappa = 1.00$ ). The inter-item correlation of the POS was found to be highly reliable for 8 items (Cronbach's  $\alpha = .756$ .) and 5 items (Cronbach's  $\alpha = .883$ ).

***POS procedure.*** During the assessment by means of the POS, which was conducted by the researcher, one child at a time was placed in a quiet room in a comfortable position at the table. Subsequently toys were offered to the child by the researcher. The child was told to play with the toys, whereas the researcher observed his/her play behavior for two minutes and gave little positive reinforcement when appropriate. The researcher was allowed to interact with the child, as long as it was an initiative of the child. The child played two minutes continuously with each toy. Every independent action of the child was scored according to seven steps; these seven steps are indicative for the three different stages of cognitive play (see appendix B for POS manual). For the ball, xylophone and car a ten second interval was used for scoring. In the end the mean score per toy was calculated by dividing the total score by the amount of 10 second intervals. For blocks, puzzle, puzzle box, matching and farm only one score was given, corresponding to the highest level of play seen in two minutes. After the child has played with the first five toys (ball, xylophone, car, blocks, puzzle box), it was assessed whether he/ she attained a score higher than three on at least three different toys, indicating that at least a basic level of functional play has been performed and the therapy was suitable for the child. If the child attained at least a mean score of 4 on 3 different toys of the POS, he/she was offered toys 6-8 (puzzle, matching, and farm). Otherwise the test was stopped. The mean score of every toy has been computed for every toy

that has been offered to the child. At the end, the mean score over all those mean scores were computed and comprises the score for cognitive play performance.

The first measurement of the POS was also used to assign the children to specific play-material levels that were used during the subsequent therapy sessions (table 2). The toys of each play-material level for the Home and the daycare centers are comparable to those of the POS but not exactly the same. For example, for POS measurements wooden blocks were used, and in therapy plastic blocks were used. Each play material level consist of comparable toys which increase in difficulty by the level. For example, the puzzle of play material level 1 consists of 6 pieces whereas the puzzle of play material level 3 consists of 12 pieces.

**Table 2.**

Classification system to assign children to play-material level.

	<b>Scores</b>	<b>Indicated cognitive level of play</b>
<b>Play-Material Level 1</b>	< 4 on $\geq$ 3 toys	functional play
<b>Play-Material Level 2</b>	> 4 on $\geq$ 5 toys	constructional play, some drama play
<b>Play-Material Level 3</b>	> 6 on $\geq$ 6 toys	constructional play & drama play

## **Design**

**Home.** To assess the effect of the COPI a within pretest-posttest design with a matched control group was used for the participants from the Home. The group was divided into two groups. One group received 10 therapy sessions in the first 5 weeks of the research period and the second group received 10 therapy sessions in the second half of the research period of 10 weeks. POS measurements for both groups were done at the start of the research period (POS1), after the 5 weeks of therapy for group 1, the control period for group 2 (POS2) and at the end of the research period (POS3). During control periods children followed their normal daily routine. Children received CE in the morning or were going to school.

**Daycare centers.** To assess the effect of COPI in the daycare centers a repeated measures design was used. The group received 10 therapy sessions in a period of 5 weeks. A shorter research period was practically not possible for the researcher. POS measurements were done at the start of the research (POS1) and after the 10 therapy sessions (POS2).

### **Procedure**

After the research of Flesch (2011) there has been a period of fifteen months without COPI. A new start of the implementation was made three months before the research started. The manager of the Home, also familiar with COPI, has attended several sessions of therapy in the Home, given by the childcare workers. Before starting this year's research all the participants in the Home already got a maximum estimated amount of four therapy sessions. The manager also practiced the therapy with the childcare workers in the daycare centers, where the therapy was introduced. The childcare workers of daycare centers were familiar with the therapy, while the children were not.

**COPI therapy.** During the intervention period the Home group received ten play therapy sessions in total in a four or five weeks time schedule. The daycare group received ten play therapy sessions in a four or five weeks time schedule either, but their pretest of the POS was done 4 weeks before the therapy started. In a therapy session the children played with two toys in a period of 15 minutes. Since the new start of COPI, every child got the therapy from the same childcare worker each time. The exact procedure of the therapy will be illustrated by means of an example of a play session with the toy 'ball' and the toy 'piano'. The childcare worker takes place with the child in a silent room. The childcare worker offers the ball to the child and observes what the child is doing spontaneously with it. Subsequently, the childcare worker follows the instructions in the protocol. First the childcare worker encourages the child through words, nodding or pointing to evoke a functional action with the ball. In case the participant is not engaging in a functional action yet, the childcare worker could model an

appropriate action, e.g. rolling or throwing the ball. If the child does not react to the demonstration either, the childcare worker could physically help the child to perform the action by putting his hand on top of the child's hand and roll the ball together. After approximately half of the time of the session the childcare worker puts the first toy, in this case the ball away and introduces the second toy, for instance the piano, and follows the same procedure according to the protocol.

### **Statistics**

All statistics were conducted using the Statistical Package for Social Sciences (SPSS, version 21.0, 2013).

For analyses with  $N < 20$ , differences with  $p < 0.1$  were considered significant and for analyses with  $N > 20$ , differences with  $p < .05$  were considered significant.

One participant was excluded from the analyses as he refused to play during the second and last measurement of the POS.

## **Results**

### **Longitudinal Effects**

To investigate whether the effects of COPI still exist after fifteen months without therapy, a repeated measures ANOVA ( $N = 21$ ) with three time points was conducted to compare the changes in CPP between the therapy period of Flesch (2011) and the fifteen months period without therapy before the intervention this year; the first measurement ( $M = 3.74$ ,  $SD = 1.67$ ) of Flesch (2011), the last measurement ( $M = 4.66$ ,  $SD = 1.41$ ) and the first measurement of this year ( $M = 4.32$ ,  $SD = 1.88$ ). Analyses revealed a significant quadratic effect ( $F(1, 21) = 17.470$ ,  $p = .000$ ,  $\eta^2$  partial = .466). This indicates that the improvement in CPP in the therapy period of Flesch (2011) is significantly larger than the change in CPP in the period without

therapy between the last measurement of Flesch (2011) and the first measurement this year. Pairwise comparisons revealed that the differences between the first measurement of Flesch (2011) and the last measurement of Flesch were significant ( $p = .000$ ). The differences between the first measurement of Flesch (2011) and the first measurement this year were also significant ( $p = .009$ ). The difference between the last measurement of Flesch (2011) and the first measurement this year was not significant.

### Effectiveness of COPI

**COPI group versus control group.** A repeated-measures ANOVA ( $N = 18$ ) was conducted to compare the means, as shown in *table 3*, of cognitive play performances of the experimental group (1) which received therapy, and the control group (2) which did not receive therapy, over the first half of the research period. Contrary to expectations, neither main effects nor interaction effects were found. Additionally, pairwise comparisons among means of the experimental group after the second half of the research period did not differ from the means directly after the intervention either, so there was not a delayed effect of the therapy either.

**Table 3**

*Mean of POS over Course of Intervention.*

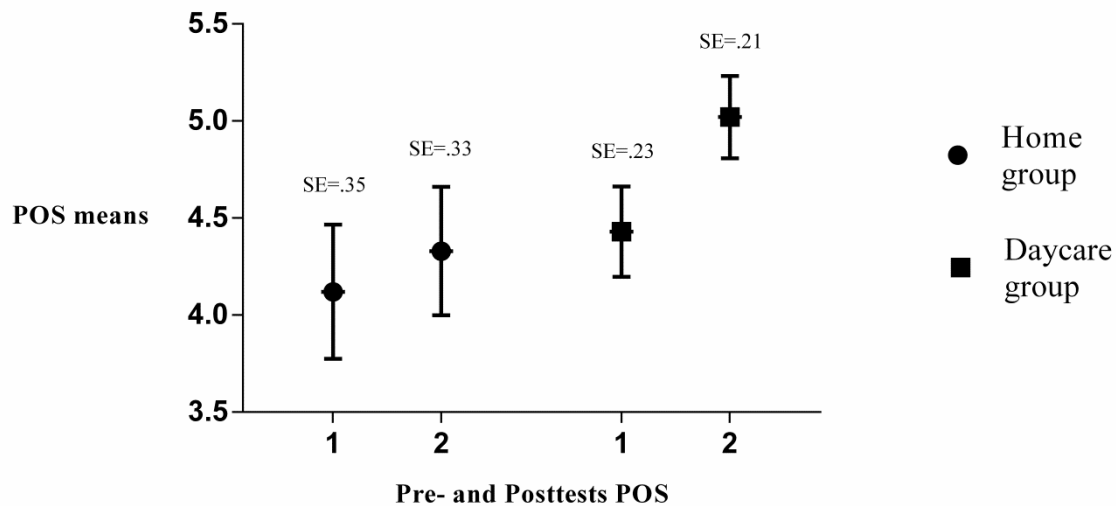
	POS 1 at T1		POS 2 at T2		POS 3 at T3	
	M	SD	M	SD	M	SD
Group 1 N=9	4.19	1.45	4.25	1.51	4.43	1.61
Group 2 N=10	4.10	1.28	4.07	1.64	4.39	1.46

*Note:* T1 = POS measurement 1, T2 = POS measurement 2, T3 POS measurement 3  
Group 1 = therapy between T1 and T2, Group 2 = therapy between T2 and T3.

**Intragroup comparisons for progress.** A repeated measures ANOVA (N = 10) with three time points was conducted to compare the progress in cognitive play performance of group (2) in the second half of the research period (therapy) to its own development during the first weeks without COPI. The expectation was to find a quadratic effect since progress in CPP was only expected from T2 to T3, the therapy period. However, solely a linear effect was found for the first measurement compared to the last measurement ( $F(1,10) = 6,91, p = .027, \eta^2 \text{ partial} = .434$ ).

**Progression between baseline and final POS.** To explore the progress in cognitive play performance between the pretest and posttest of the Play Observation Scale for all groups of participants (group 1, group 2 and daycare group), a repeated measures ANOVA's has been conducted (N=38). The analysis revealed that the means of cognitive play performance of the posttest (M = 4.67, SD = 1.24) are significantly higher than the means of the pretest (M = 4.28, SD = 1.28), ( $F(1, 38) = 23.786, p = .000, \eta^2 \text{ partial} = .398$ ). The results are shown in *figure 1*. The analysis revealed an interaction effect. The daycare children showed more progression than the Home children ( $F(1, 36) = 5,635, p = .023, \eta^2 \text{ partial} = .135$ ). Post-hoc repeated measures ANOVA's to measure the progression for group 1 and 2 together (N=19) revealed that this was not significant, while the progression for the daycare group was ( $F(1, 19) = 45,16, p = .000, \eta^2 \text{ partial} = .715$ ) These results indicate that the significant growth in cognitive play performance for all the participants is caused by the improvement of the daycare group.





Note: Pre- and Posttest = POS measurement before (1) and after (2) 10 therapy sessions.

**Figure 1.** Progression in cognitive play performance between pretest and posttest Home group and daycare group.

### Discussion

The first aim of the present study was to measure to what extent the effects of COPI are still visible after fifteen months without COPI. In contrast to expectations results did not show differences between the last POS measurement of Flesch (2011) and the first measurement this year. Results indicated that the extend of change in CPP is larger for the therapy period than the change after a period without therapy. Therefore, this results indicate that the positive effects of COPI are stable and the children still benefit from the effects of the therapy when this has stopped. Children seem to maintain the same level of CPP during the last measurement after a therapy period. An explanation could be that children maintain their CPP as a result of practicing their abilities by playing themselves or by volunteers.

The second question relates to what extent the effects of COPI increase after a renewed start of COPI. The expectation was, based on the positive results in previous years of COPI that the therapy will again evoke higher levels of CPP than before the intervention, as measured with the POS. Overall, this study did not find the positive effects of previous years

in the Home. The group of children from the Home did, for the biggest part, not show any progress in CPP by means of the POS. A significant linear effect was found for the second group, indicating that this growth in CPP is partly established in a period without therapy. Considering the limited amount of participants per group (N=10), this lack of effect seems to be caused by the high variability of POS scores in the Home group. One measurement moment per evaluation of the POS, as used in this research is sensitive to variability. The limited amount of time available for the POS measurements could have caused stress among children. The stress could have influenced the results of the measurements. Performing two POS measurement moments for each evaluation wave could be a solution. However, training effects of the POS could also appear. To overcome training effects while performing two POS measurements for each evaluation, different toys for each POS have to be used.

Contrary to the Home group, the daycare group did show increases in CPP after COPI. These results are comparable to those found in the Home by Flesch in 2011. Since the design of Flesch (2011) and the daycare group of the current study did not include a control group, increases in CPP could have been caused by training effects of the POS measurements. The current study is as including matched control groups, able to make the possibility of training effects improbable. Therefore, it is possible that effects of COPI neither would have exist when the current study uses control groups for both groups.

The distinct difference between the progression of the Home group and the daycare group has more possible explanations. First, the daycare group did not receive COPI or any other form of therapy before, contrary to most of the children of the Home group who received their first therapies five years ago. Therefore, it is plausible that daycare children were more able to further develop their cognitive abilities, whereas Home children may have reached their maximum capacity. Additionally, it may be that the possibility of progress in CPP depends on the play levels. The difference between 'functional play' and 'constructional play', may be

smaller than the difference between ‘constructional play’ and ‘drama play’. To perform drama play the child needs to understand the function of the toy, while for functional play and constructional play this is not essential. Flesch (2011) has proven that the initial level of CPP influences the possibilities to grow in CPP. Children with a higher initial level of CPP showed less progress in CPP than children with a lower initial level of CPP did. Therefore it is plausible that children need more and longer training in ‘drama play’. Consequently it is recommended to extend the amount of material for ‘drama play’ for the Home Children in the intervention. For new groups, as this year’s daycare group, this extension does not seem to be necessary yet as they could still grow on the scale from functional to constructional play. By including daycare children in COPI, a broader group of children needs to be served. Participants did have a wider variety of disabilities, age and therefore possibilities. As a consequence of that, the COPI therapy needs to extend their materials by including more difficult toys and other play levels.

A second explanation is that the daycare group received therapy from different childcare workers than in the Home. The daycare childcare workers were selected to work in the daycares because of their good qualities. Therefore it is possible that the quality of the therapy in the daycare group and the Home group differed. It is recommended to develop an instrument to measure therapy quality in terms of the extent to which childcare workers perform the therapy according to the guidelines, and study the effect of quality on therapy outcome. For an instrument to measure the quality of the therapy see appendix C.

Furthermore, part of the therapy sessions of the Home group were videotaped (see appendix C). Childcare workers and children may have been influenced by the presence of the video camera and the researcher. This may have influenced the quality of the therapy by distraction or fear of evaluation.

Another explanation for the differences between the progressions of the Home group and the daycare group, could be that the mean age of daycare children which participated in the intervention is ten years younger than the mean age of the Home children, which may mean that they still have more potential for growth. Moreover, in general the daycare children were less physically handicapped than the children who are living in the Home. Although children needed to be able to move at least one hand properly, influences on POS measurements may still exist. Flesch (2011) however, found out that motor abilities did not moderate the effectiveness of CPI in the Home group. It is possible that motor functioning will moderate when daycare children are included in the study. Future research has to take these differences in motor abilities of children into account.

The current study involved a small sample size (N=19 for the Home group and N=19 for the daycare group) and therefore trends that have been found may be significant effects in larger groups. The progression in CPP is measured by means of the POS. This instrument supposes that learned skills in therapy will be generalized by children to other, comparable toys as used in the POS. There could have been effects of the therapy in the Home Group which are not detected by means of the POS. Earlier research of Flesch (2011) showed that the amount of independent play during the intervention was increased, but did not have influence on CPP by means of the POS. Therefore it is recommend for further research to measure the CPP by means of the POS as well as the level of independent playing.

Another limitation is that the scoring of the POS was done while videotaping, what can influenced children. Some children are more nervous by seeing the, quite unfamiliar, researcher and therefore may have not played at their fullest level has been done while using videotapes.

In the daycares, there were no silent rooms available for the POS measurements, this might have influenced outcomes. Considering the progression of daycare children despite

these circumstances, it is plausible that effects of COPI could have been larger when facilities had been of equal quality as in the Home.

In the future it will be interesting to measure if the children not only show more independent play behavior as measured by the POS, but also show more play behavior in daily life. Children could be offered various play material and the spontaneous amount of play could be measured.

In conclusion, the aim of this study was to evaluate COPI in Sizanani Children's Home and daycare centers. There are indications that effects of COPI persist over time, even without further training. In contrast to the research of Flesch (2011), there were no additional effects found for the Home children after ten sessions of COPI. However, the daycare children did show significant progression after the implementation of COPI. The therapy did not seem to have the intended growth in CPP when the therapy was given before, but when children receive therapy for the first time, children do seem to benefit from it. This indicates that the current protocol of COPI is no longer beneficial for children in the Home and needs to be extended or improved. Further study needs to be done to further explore the (long-term) effects of COPI so that a wide variety of children could benefit from this therapy.

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## Appendix A

### Protocol Cognitive Object Play Intervention (Flesch, 2011)

#### **Goal of the intervention:**

- Eliciting the child's play potentials with just as much support as needed.
- Get the child to play independently on a higher level.
- Give the child support and help the child to learn a new activity.

BUT!:

- Give the child just as much support as really needed!!

#### **How can you help the child?:**

Check what the child can do by himself spontaneously at the beginning of every session.

1. Try to motivate the child with words, telling him what he could do.
2. Try to demonstrate to the child what he could do with the toy.
3. Try to help the child physically.

#### **Procedure:**

- start on time to give yourself and the child enough time to prepare
- check on the list in the unit which child gets to play that day
- walk to therapy building with one child at a time and put child in a comfortable position at the table in either the library (girls) or blue group (boys)
- go to the toy library and check on the list which toys you need
- go back to the child and play with each toy for 5 minutes according to the guidelines
- read the instruction sheet what actions you can teach & how you should present the toy to the child
- give the child a chance to initiate an action
- if the child is either not interested or not able to play with the toy, he should be encouraged and helped according to the initiative he shows spontaneously
- bring the toys back to the right spot in the toy library and check that everything is complete
- bring the child back, pick up the second child and start all over



## **Practical Points:**

### **What to do in bad weather conditions?:**

- go to the toy library and get the toys you need for the session
- find a quiet place in the unit (e.g. put a table in one of the bedrooms)
- play with one child and one toy at a time (two toys per session)
- bring the toys back to the toy library at the end of the sessions and make sure they are complete

### **What to do if you are scheduled to play, but you are not on duty?:**

- ask one of your colleagues to play with the child; moving the play session of the child to another day is not an option!

Because:

- there is just a limited amount of toys for the therapy; the toys you might need could already be used by someone else
- there won't be time the next day for an additional child

### **What to do if the child is sick?**

- play with a child that is scheduled to play the next day
- the sick child can then take his place the following day

**The play sessions should be fun for you and the child!!**

## Appendix B

### Play Observation Scale (POS) 2013 (Flesch, 2011)

#### **Theoretical Background:**

The Play Observation Scale measures the level of cognitive play abilities indicating the level of cognitive development within Piaget's sensorimotor stage. The POS is based on Smilansky's stages of play behavior representing different stages of cognitive development within Piaget's sensorimotor stage. Piaget (1962) differentiated three successive stages of play requiring different cognitive tasks that should be mastered by the child and give an indication of the children's cognitive level. The first stage 'functional play' is characterized as a stage with simple repetitive physical behaviors without a specific purpose, for example hammering with the blocks on the table. The second stage 'constructive play' is defined as manipulating objects and creating things with the toys offered, for example building a tower with the blocks. The last stage 'dramatic play' is described as pretend play, requiring a higher level of cognitive functioning like building a house with the blocks and pretending to live there.

#### **Procedure:**

##### ***a) Scoring to assess level of cognitive play performance:***

Children are offered various toys in a free play session and their play performance without any assistance will be observed. Toys used in the free play sessions resemble the toys used during therapy, but are slightly different in order to prevent habituation.

After having played with 5 toys, it has to be assessed if the child attained a score higher than 3 on at least three different toys, indicating at least a basic level of functional play. If the child attained at least a mean score of 4 on 3 different toys of the POS, he/she will be offered toys 6-8 or otherwise will stop the test.

The possible actions for each toy are divided into seven steps; these seven steps are indicative for the three different stages of cognitive play. This can be illustrated by an example for possible actions with the xylophone: score 1 = 'no action', score 2 = 'touching' and score 3 = 'picking up', where 2 and 3 characterize two steps in functional play, score 4 = 'making sound without the stick' and score 5 = 'making sound using the stick' represent two steps in constructional play, and the last steps 6 = 'producing a music tone' and 7 = 'playing music from right to left and/or vice versa' show characteristics of dramatic play

More precisely, the children will be offered the first five toys one after another each for a period of 3 minutes and their toy play behavior without adult interference will be observed. For toy 1-3 (ball, xylophone and car) children will receive scores in the range of 1 to 7 during three minutes in 10 second intervals based on their shown play behavior in those intervals. For their play performance with toys 4 to 8 (block, puzzle, puzzle-box, number-puzzle and memory) the children will receive one score between 1-7 after a three minutes observation period, representing their maximal score over the period. A maximum score is more representative for those toys than an average score over the whole period would be. For toy 9 (stuffed animals (lion and camel)) the child receives again scores in the range of 1 to 7 during three minutes in a 10 second interval based on the play behavior performed in those intervals. At the end, compute the mean score for every toy offered, add them up and calculate a total mean score from all the toys that the child played with.

***b) Scoring to assign children to play material 1, 2 or 3:***

The POS is also used to assign the children to specific play-material levels that are used during therapy (table 1). Choosing toys appropriate to the children's current abilities ensures an optimal starting point to challenge the children and elaborate their play skills. Additionally, to further control for the physical limitations of the participants, most of the play-material has been refined. For instance the original puzzle box has been replaced by one with bigger wholes and bigger objects that are easier to grab.

Once the child masters to play independently with the toys from the assigned play-material level, he/she can move on to a higher play-material level.

**B 1.**

Classification system to assign children to play-material level.

<b>Scores</b>	<b>Indicated cognitive level of play</b>	
<b>Play-Material Level 1</b>	< 4 on $\geq$ 3 toys	functional play
<b>Play-Material Level 2</b>	> 4 on $\geq$ 4 toys	constructional play, some drama play
<b>Play-Material Level 3</b>	> 6 on $\geq$ 5 toys	constructional play & drama play

## **Toys:**

**1. Ball:** The ball is placed in front of the child. Observe what the child is doing with the ball. If the child initiates an interaction with you (throwing the ball to you, rolling the ball to you), participate as long as it comes from the child. Otherwise observe the child's actions for 3 minutes.

**2. Xylophone:** Place the xylophone in front of the child and observe what the child is doing with the xylophone during a period of 2 minutes.

**3. Car:** Put the car in front of the child and observe what the child initiates. If the child pushes the car over to you and wants you to push it back, participate in the game. Otherwise just observe the child for 2 minutes.

**4. Blocks:** Put the blocks in a row in front of the child and observe if the child is just moving the blocks, hammers with it, throws them or actually builds something.

**5. Matching game:** Present the child the 5 pair that you are going to play with.

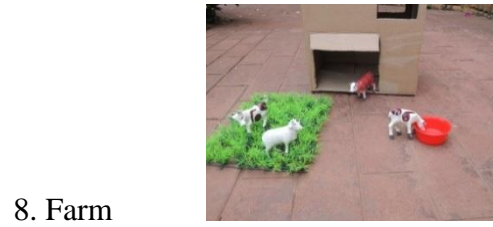
**6. Puzzle Box:** Put the puzzle box and the pieces in front of the child and score if and how many pieces the child puts in by himself.

**7. Puzzle:** Put the puzzle and the pieces in front of the child. Observe the child for 3 minutes and score how many pieces the child put in correctly or what else he initiates with the puzzle.

**8. Farm:** Place the two animals next to each other in front of the child, so that both animals are facing the child. Observe what the child is doing with the toys for 2 minutes.

Children that are limited in their play because of obvious physical handicaps, can receive help from the instructor. If it is for example difficult to turn around the memory cards or putting puzzle pieces together, the child can point to the memory card he wants to be turned around or point at the two puzzle pieces he would want to put together and the instructor can carry it out for the child. But only exactly those cards or pieces the child is pointing at.

**B2. Toys used for the POS:**



Toy	0	1	2	3	4	5	6	7
<b>1. Ball</b>	No action	Looking/ Reaching	Touching/ Holding	Picking up/ Squeezing	Rolling	Rolling back & forth between two people	Throwing the ball	Throwing the ball & catching
<b>2. Xylophone</b>	No action	Looking/ Reaching	Touching/ Holding stick	Picking up stick or xylophon/rolling xylophon	Making sound without the stick	Making sound with the stick(on purpose)	Making music (tone)	Making music across from left to right
<b>3. Car</b>	No action	Looking/ Reaching	Touching	Picking up/ Moving a bit	Rolling	Rolling back & forth between two people	Play driving	Play driving and making sound
<b>4. Blocks</b>	No action	Looking/ Reaching	Touching	Picking up blocks holds it or hammers it on table	Put two blocks next to each other/or on top of each other	Put more than two, blocks next to each other or on top of each other	Making objects with more than 5 blocks on the ground floor	Making objects with more than 5 blocks higher than ground floor OR A TOWER
<b>5. Puzzle box</b>	No action	Looking/R eaching	Touching	Picking up pieces or puzzle box	Try to put blocks in hole	Put 1-2 blocks in correct holes	Put 3-5 blocks in correct holes	Put 6-8 blocks in correct holes

<b>6. Matching Game</b>	No action	Looking/ Reaching	Touching	Picking up	Search for matches	Find 1-3 matches	Find 4-6 matches	Find 7-8 matches
<b>7. Puzzle</b>	No action	Looking/ Reaching	Touching	Picking up a piece	Try to do the puzzle	Put 1-3 pieces in the right spot	Find 4-7 pieces in the right spot	Put 8-10 pieces in the right spot
<b>8. Farm</b>	No action	Looking/ Reaching	Touching	Moving objects from one spot to another without purpose	Play walking/playing/drinking/eating or any other purposeful action with object(s)	Shows 2 purposeful actions with object(s)	Shows 3 purposeful actions with object(s)	Shows 3 or more purposeful actions with object(s) with sound

## Play Observation Scale Coding Sheet

Name of Child:

Unit:

Free Play Session:

<b>1.</b>	0.10	0.20	0.30	0.40	0.50	1.00	1.10	1.20	1.30	1.40	1.50	2.00	
												Total	
												Mean	

<b>2.</b>	0.10	0.20	0.30	0.40	0.50	1.00	1.10	1.20	1.30	1.40	1.50	2.00	
												Total	
												Mean	

<b>3.</b>	0.10	0.20	0.30	0.40	0.50	1.00	1.10	1.20	1.30	1.40	1.50	2.00	
												Total	
												Mean	

<b>4. Blocks</b>	Total
Score	

<b>5. Shape box</b>	Total
Score	

<b>6. Matching</b>	Total
Score	

<b>7. Puzzle</b>	Total
Score	

<b>8. Farm</b>	Total
Score	

**TOTAL:**

**MEAN:**

## Appendix C

### COPI Integrity Scale

#### **Background**

COPI has a clear theoretical background, as described earlier. However, there is limited empirical evidence that this therapy works due to its specific theoretical features. Positive effects were found although this could have been caused by several side effects. For example, an improvement in Cognitive Play Performance after COPI could also be caused by other therapies that are given in the Home. Despite of the positive results, for further extending and using this therapy in Sizanani Children's home the precise working mechanisms have to be made clear. Consequently, it will be assessed if the improvement in CPP is mediated by the integrity of the therapy. That means that it will be assessed if a greater improvement in the cognitive level of play is accompanied by a higher integrity of the therapy given by the childcare workers. To measure this integrity of the childcare worker, a new observation instrument has been developed: the COPI Integrity Scale. This scale measures to what extent the childcare worker is giving the therapy according to the protocol. This scale consist of three subscales: 'Initiative of child', which measures if the child gets enough time to explore independently without help of the childcare worker; 'Correct next steps', which measures if the childcare worker initiates the correct next step according to the protocol. And the last subscale: 'Positive feedback', this scale measures if the childcare worker gave positive feedback when the child showed a desired response. Every child will receive the therapy from the same childcare worker. If the therapy shows better results with higher scores on the integrity scale, this will stand for the fact that these elements of the therapy are indeed important for success. Additionally, if it turns out that specific features of this therapy especially will lead to higher results, this will be helpful information for further extending and improving this intervention and training the childcare workers. Besides this, a possible low



average score on one of the subscales, will give important practical information about the integrity of the childcare workers, which can be useful for training childcare workers to achieve a higher integrity score. The COPI Integrity scale is developed for use by professionals which are familiar with therapy and the diversity of disabled children.

### **Reliability**

To calculate the inter-reliability of the integrity scale-COPI a random sample of ten video's were scored by the researcher. The percentage of agreement for measuring initiative of child was 56.44 % (SD = 26.27); for initiates correct next step 45.37 % (SD = 19.77) and for positive feedback 44.78 % (SD = 24.63). Since this inter-reliability is too low, the integrity scale could not be used this year.

### **Procedure**

**Initiative of child.** According to the 'Sensitive Assistance', children need as much support as needed. Therefore, children need time to go to the second step in playing independently. Every time after a childcare worker carried out one of the three steps he has to give the child the chance to play himself. A guideline is 5 seconds waiting, but this is freely interpretable by the observer. Immediately after the toy is offered to the child, at the beginning of the therapy, a waiting time is included.

**Initiates correct next step.** Each interval of 30 seconds childcare workers perform at least one action. Thereby, the correct next step needs to be taken in correct sequence (1. Try to motivate the child with words, telling him what he could do. 2. Try to demonstrate to the child what he could do with the toy. 3. Try to help the child physically.)

**Positive feedback.** An obvious, positive reaction resulting from a child's correct behavior. Positive feedback can be recognized by voice, facial expression, or motion of the hand.

## **Scoring**

When incorrect behavior is shown, put a cross in the square at the right time interval. If correct behavior is shown, put a tick in the square at the right time interval. A tick is used to remark correct behavior of the childcare worker in that time interval. A cross is used when faults are made or when more than half of the interval time wrong behavior is shown. Only use intervals when applicable. For example, when children do nothing right, positive feedback is not applicable. The total score per subscale consist of the percentage ticks out of the percentage used intervals, so that there will be 6 final scores.

