Can the cognitive level of play in disabled youth be improved by structured play therapy?

Master thesis Child and Youth Psychology

July 2016

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Abstract

Background: The effectiveness of a Cognitive Object Play Intervention (COPI) was examined in a sample of 32 disabled children and (young) adults of a residential children's home and its accompanying day care centres in South-Africa. COPI intends to improve the cognitive level of play through structured scaffolding techniques. **Method:** Progress in play was examined during the intervention period as well as by means of a generalization test where an untrained object set without support was given. Maintenance effects were studied both 5 weeks and 9 months later. Additionally, it was examined if COPI's effectiveness depended on the participant's initial level of cognitive play. Finally, the integrity of the therapy and the relation between elements of the intervention and growth in play performance were examined. **Results:** During the training the participants showed an increase in independent play and a decrease in support needed. After 10 COPI sessions participants showed an improvement on the generalization test, while participants in the control-group did not. These effects were maintained over a 5-week period as well as over a period of 9 months. Further analysis revealed that effects were more positive for participants with a lower initial level of play performance. The therapy in general was given as intended for more than half of the time and variation in integrity did not predict cognitive growth. **Conclusions:** Findings suggest that COPI is a useful intervention method for improving play skills of disabled youth. Implications for further research are discussed.

Keywords: object play; intervention; disabilities.

Normally, children develop play skills spontaneously and without problems. Parents are often surprised to see how quickly their child develops his play skills and learns how to play with toys. Literature shows that playing with toys offers children useful experiences and promotes their cognitive, social, as well as their language development (Bergen, 2002; Bruner, Jolly & Sylva, 1976; Tomasello & Farrar, 1986).

Play in children with disabilities tends to be less developed compared to peers without disabilities (Malone, 1999). They do not only show a lack of motivation to initiate play and a low mastery motivation (Majnemer et al., 2013), but without instructions they also tend to use fewer novel play behaviours, and use less variety and complexity in their play (Malone, 1997; Lifter, Mason & Barton, 2011). Hence the need for structured play interventions in disabled children is widely recognized (Casby, 2003; Lifter, Foster-Sanda, Arzamarski, Briesch & McClure, 2009; Lifter et al., 2011; Munier, Myers & Pierce, 2007) and research indicates that such interventions for these children can be effective in stimulating their development (see Barton & Wolery, 2008 for an overview).

For this reason, Cognitive Object Play Intervention (COPI), a structured play intervention aimed to enhance the cognitive level of play performance with toys, was implemented and investigated in a residential facility and its accompanying day care centres in South Africa that accommodates youth and (young) adults with diverse levels of intellectual and physical disabilities (Van Beek, Wijnroks, Flesch & Vermeer, submitted; Mannaert & Van Beek, in preparation). COPI was developed to be suitable for use in developing countries, where caregivers are usually not educated in special care for disabled children. The intervention focuses on stimulating object play and intends to specifically support disabled children to reduce limitations for play, foster mastery motivation, and stimulate knowledge about possible actions with toys. As such, COPI's goal is to enhance the cognitive level of play performance.

More specifically, as diversity and complexity of object play is lower in children with disabilities (Malone, 1997; Lifter, Mason & Barton, 2011), the aim is to stimulate participants to increase the number of possible actions with toys as well as to gradually increase the complexity of play actions (Frey & Kaiser, 2011), the latter tending to an increase in cognitive challenge, e.g. a 5 versus a 10 piece puzzle, or an increase in the developmental level of play described on a scale from functional play, via constructive play to drama play. These stages are described by Casby (2003) to be useful as a developmental framework for play-based interventions in disabled children. In the first and simplest stage, 'functional play', the child explores and experiences his immediate environment, though simple repetitive physical behaviours without a specific purpose, such as grasping, mouthing or hammering with a block. The second stage, 'constructive play', is defined as manipulating objects and creating things with the toys offered, for example building a tower with blocks. The last stage, 'drama play', is described as pretend play or as-if orientation to actions and objects, e.g. playing with a doll and giving the doll a bottle of milk as if one acts like a parent. This stage requires the player's awareness that he or she is pretending and consciously realise that a pretend situation is mentally represented (Smilansky, 1968).

In order to activate the child to engage in play behaviour, COPI uses a teaching method based on Vygotsky's scaffolding principles (Fu & Stremmel, 1993). This widely used method in teaching play skills in children with disabilities (Barton & Wolery, 2008) provides them with enough motivation and stimulation, but still ensuring enough freedom to learn to play independently. The support, given by trained childcare workers, is gradually removed as the learner can master the task more independently. COPI procedures specifically intend to stimulate children in their own 'zone of proximal development', by closely matching the toys and play activities during training to the initial cognitive level of play, and by closely tailoring the stimulation and support of the trainer to the needs of the child.

The effectiveness of COPI was previously assessed in the same residential home and its affiliated day care centres in South Africa as the current study (Van Beek, Wijnroks, Flesch & Vermeer, submitted; Mannaert & Van Beek, in preparation). The studies showed that cognitive play performance improved during the COPI training sessions as well as outside the training by means of an independent test, using an untrained toy set and measured by the researcher without giving support, implicating a generalization effect to similar tasks. However, positive effect of an intervention can vary over time following the intervention period. They may decrease rapidly or slowly, or they may persist for a long time. In order to infer effectiveness, there must be evidence that the effects maintain over a long period of time (Flay et al., 2005). A weakness across the results of various play interventions has been that the acquired play skills do not always maintain over time or were never researched (Barton & Wolery, 2008). While showing positive results of COPI during the intervention period, follow-up assessments showed contrary results. Van Beek, Wijnroks, Flesch and Vermeer (submitted) and Mannaert and Van Beek (in preparation) showed a maintenance of play performance after a long period of at least 9 months without COPI and a trend of increased play performance when the intervention was maintained. However, the study of Mannaert and Van Beek (in preparation) additionally showed that there was a decrease of play performance after a relatively short period of 6 weeks without COPI following an intensive period of COPI sessions. A possible explanation for lack of short-term maintenance of growth in cognitive play during the study of Mannaert and Van Beek (in preparation) could be that the learning curve weakens over time after already receiving COPI in previous years. Participants might have been learning near the top of their abilities, making gains in cognitive play performance more difficult to maintain. Previous achieved effects might have been more easily maintained over the course of several months because COPI was still relatively new by then. For the retention of additional gains, more training seemed to be

necessary than the relatively short period of 6 weeks. Therefore, COPI continued to be implemented at the same residential facility and its affiliated day care centres, though at a lower level of intensity compared to the research period of Manneart and Van Beek (in preparation). The expectation was that this long period of therapy will result in growth of cognitive play performance over a course of 9 months.

Furthermore, it is expected that further growth in play level is possible by increasing the intensity of intervention. Effects of COPI will again be assessed during as well as outside the therapy. During therapy, the expectation is that the number of independent actions with toys will increase and that the level of support children needed in order to perform particular play actions will decrease during the course of COPI. Outside therapy (i.e. providing the participants with similar tasks, but tested with different toys and by a researcher who did not provide help other than verbal encouragement), it was expected that the cognitive level of play performance is higher after a 5-week period with 10 COPI sessions, as compared to the control group.

Since the children thus continuously received COPI for almost a year, play skills learned during previous studies are rehearsed more often and should be more ingrained, making it easier to achieve and maintain additional gains in cognitive play. Therefore, we expected that a follow-up after 5 weeks will show that the effects of COPI on the children's cognitive play performance will be maintained after a short period without receiving the intervention.

Additionally, it was examined which participants benefitted the most from COPI. Even though the training is attuned to each child's 'zone of proximal development', it should be acknowledged that disabled children show different capabilities and might profit differently from COPI. In order to increase the level of play, children with a lower initial level of cognitive play have to change from functional to constructive play, while children

with a higher level of play have to increase from constructive to drama play. Difficulty in progress to a higher stage seems to be different for all cognitive levels of play. Functional and constructive play ideas arise from affordances of the play materials themselves, whereas ideas of pretend play involve generativity and set shifting (Rutherford, Young, Hepburn &Rogers, 2007). As such, it may be more difficult to develop from constructive to pretend play than from functional to constructive play. For this reason, it was expected that participants with a lower initial level of cognitive play would show greater improvement in play skills after receiving COPI than participants with a higher initial level of play.

While the study of Van Beek, Wijnroks, Flesch and Vermeer (submitted) found results that correspond with this hypotheses, Mannaert and Van Beek (in preparation) did not found a relationship between initial level of cognitive play and growth in play performance. According to the researchers this might be due to improvements in the dramatic play objects, resulting in better assessment of pretend play. However, improvement in drama play was mostly based on the quantity (i.e. the amount of actions with the doll) and not so such on the quality of drama play (i.e. sequence pretend play (Belsky & Most, 1981)). Hence growth in cognitive play did not adequately reflect actual growth in pretend play. Therefore, we improved the dramatic play scale to ensure that progress in children with a higher initial level can be better assessed.

Conclusions drawn about the obtained results would be ambiguous when it is uncertain whether the trainers adhered the intervention as intended. As such, therapy adherence plays an essential role in evaluating its effectiveness (Lane, Bocian, MacMillan & Gresham, 2004; Perepletchikova & Kazdin, 2005). If the results indicate that the intervention is effective, it is important to ensure that the intervention was carried out according to the specific procedures (therapy integrity). Previous evaluations of COPI (Van Beek, Wijnroks, Flesch and Vermeer, submitted; Mannaert & Van Beek, in preparation) did not examine if the

intervention was implemented as intended. Therefore, the results do not assure whether growth in play performance was caused by the intervention-specific procedures, or by more general learning factors such as the opportunity to play, one-on-one attention or other, non-intervention forms of stimulation provided by the trainers. Hence the present study examined to which degree the specific procedures of COPI are adhered by the trainers. Furthermore, it was examined which specific elements of the intervention were related to growth in cognitive play. As the intervention is based on the scaffolding principles of Vygotsky, it was hypothesized that especially this element of COPI was related to growth in cognitive play.

Method

Participants

In the current study, 32 children and (young) adults of a residential home, a group home as well as three-day care centres in South Africa were selected to participate in the COPI training. More specifically, they were children and young adults who were physically able to play, which means that they had to be able to move at least one arm and hand. Moreover, at least a basic awareness of, and reaction to the environment was necessary to be selected. Selection was based on the professional judgment of the manager of the home, as she knew the participants best and was able to take their physical and mental level into consideration. Furthermore, all selected children were tested by means of the POS (see below) to determine if growth in play level on this scale was possible. Only children with a total score of 56 or lower were selected to participate in the COPI training, i.e. those participants that were still able to increase at least 1 point on each toy.

The selected group consisted of 18 participants of the residential home, of which 5 girls lives in a group home (a guided living accommodations for girls), and 14 of the day care centres. Of the total participants, 20 were boys (62,5%) and 12 were girls (37,5%). They

ranged in age from 4 to 35 years old ($M_{age} = 16.84$, $SD = 8.90$). All participants had mild to moderate intellectual disabilities.

Given the limited resources in South Africa, not every participant had a proper diagnosis; the following descriptions are only indications of the disabilities. The residential group consisted of 18 participants, 10 boys (55,6%) and 8 girls (44,4%). Their ages ranged from 4 to 35 ($M = 21.56$, $SD = 8.86$). Most of them were diagnosed with cerebral palsy (77,8%), while five participants had additional developmental disabilities (i.e. microcephaly, scoliosis and hydrocephalus), seven participants had epilepsy and three participants had additional visual of hearing impairments.

The day care group contained a total of 14 participants, 10 boys (71,4%) and 4 girls (28,6%). Participants in the day care group were generally younger, with ages ranging from 5 to 18 and a mean age of 10.79 ($SD = 4.00$). Some of the participants in the day care centres had Down syndrome (28,6%), while four participants had other developmental problems (i.e. ADHD, ASD and cerebral palsy), once accompanied by visual impairments. Generally, they were referred to the day care centres because their intellectual abilities did not exceed pre-school level and therefore regular primary school was not within reach for them.

Since the COPI program is investigated in this residential facility for four years, most of all 32 selected children also participated in earlier studies and received the intervention for at least a year (N = 26, 81,25%), while the rest was new to the study (N = 6, 18,75%).

Procedures were performed in compliance with the relevant South-African laws and guidelines. Parents of participants in the day care centres signed an informed consent form. For the orphaned participants or those of whom it is not known where parents live, the institutional committee has approved the procedures on behalf of the participants.

Instruments and Procedure

Cognitive Object Play Intervention (COPI). All participants attended 10 COPI

sessions, spread out over approximately 5 weeks. Children were matched to a specific trained childcare worker, to ensure that all 10 training sessions would be given by the same trainer. Every training session then consisted of playing with two appointed toys for a total of 10 minutes. Every child played with all six toys at least three times by changing the toys used in the different sessions. In an attempt to keep all participants interested and motivated, toys used during the COPI sessions were unfamiliar for all participants as all toys were replaced by different versions of the same type of toy (e.g. a truck was replaced by a bulldozer).

Before the COPI sessions started, all trainers were made familiar with changes in the procedure compared to the procedures followed the past year and different toys used in the intervention. During the sessions a toy was placed in front of the child. A trainer then observed a child's spontaneous response and where needed, started with trying to evoke an action with the lowest level of support: verbal and nonverbal support, for example by pointing at the object or using words like: 'look at the ball'. In case the child was not yet engaging in a functional action, the trainer modelled an appropriate action with the toy (e.g., show a child how to hold or roll a ball). If more help was still needed to get the child to show an action, the trainer could perform the action together with the child using hand- over- hand physical help (e.g., put their hand on the child's hand and hold or roll the ball together). When a participant completed an action, the trainer would go on and try to evoke increasingly difficult actions until the next action was outside the possibilities for a specific child and/or the 5 minutes of time for that toy were completed. Each toy was accompanied by a toy-card for the trainer. This card contained detailed instructions on the possible, increasingly difficult, actions and which support to offer in response to the child's actions. Ideally, the child would gradually perform more actions, need less support and perform more of these actions by him/herself. After approximately 5 minutes of playtime with the first toy, the trainer introduced a second toy and followed the same procedure.

Level of Independent Play Scale (LIPS) and Level of Support Scale (LOSS).
Three times during the training the level of play was observed by means of the LIPS and the assistance needed was examined by means of the LOSS. Both scales were scored during observations of the first, fifth and tenth COPI-session. In these sessions the same two toys were offered to the child so that obtained scores could be compared.

To measure the level of independent play shown by the child, possible actions with the toys were divided into 6-8 actions, comparable to the actions in the POS (only showing visual attention was not included here) and ranged from functional to more constructive and drama play. The number of these actions that the children displayed without support from the trainer was observed. A score on the Level of Independent Play Scale (LIPS) was obtained by dividing the number of independent actions shown by the participant on the two toys by all possible actions of the both toys.

The Level of Support Scale (LOSS) measured the level of support a participant received in order to carry out the performed actions. Support is divided into 'no support', '(non)verbal encouragement', 'modelling' and 'hand-over-hand support'. When no support was needed to carry out an action, a participant received no points for that action. For receiving verbal and nonverbal encouragement 1 point was given, 2 points for modelling and finally 3 points were given to the participant when physical hand-over-hand support was needed to carry out the action. If the child did not perform an action at all, because it was still too complex or time ran out while still mastering easier actions, 4 points were given. A score was obtained by dividing the amount of points for the needed support by all possible actions of the two toys.

The inter-observer reliability for the LIPS and the LOSS was determined by scoring 10 videorecordings of the COPI sessions by two independent observers and appeared to be good for both the LIPS (Cohen's $\kappa = 0.81$) and LOSS (Cohen's $\kappa = .83$).

Play Observation Scale (POS). To assess the progress in the cognitive level of performance independent from COPI, the Play Observation Scale (POS) was used. The POS in the present study is a modified version of Ruben's POS (1984), which is based on Smilansky's (1968) sequence of play. During the assessment of the POS, participants were offered various similar, but different toys from the toys used during the COPI training. During this free play session, their play performance without any assistance was observed. Nine toys were used, eliciting different levels of cognitive play, starting with the easiest toy and gradually introducing increasingly complex toys, thereby placing continuously higher demands on cognitive functioning.

Since the POS was already used to measure the progress in play performance before (Van Beek, Wijnroks, Flesch & Vermeer, submitted; Mannaert & Van Beek, in preparation), in order to avoid possible learning effects of multiple assessments, some adjustments to the toys used in this test were made (see Appendix J).

Possible actions with the toys were subdivided into different levels that were indicative for the different stages of cognitive play, with low scores referring to more functional play, and higher scores to more constructive play or drama play. Most toys had a scoring system consisting seven levels indicative for mostly functional and constructive play, the doll consisted nine levels indicative for both functional and drama play (see Appendix E).

The POS was conducted by the researcher. During the assessment the participant was placed in a quiet room in a comfortable position at the table, in such a way that activity limitations were as low as possible. The researcher started the play session by offering the first toy (ball) to the participant. The participant was allowed to play independently with the toy for 2 minutes. While playing, the researcher scored the participant's play actions and only gave positive verbal and nonverbal reinforcement when appropriate actions were shown. The researcher could join in the game, for example by tossing the ball back to the child, but only

when clearly initiated by the participant. After 2 minutes the next toy was offered to the participant and the play actions in the second session were scored again following the same procedure.

Toys that required a stepwise sequence of handlings where the final result was decisive (puzzle, shape box, matching and colour & shape puzzle) as well as the doll, where a score depended on the quality of drama play over the entire 2-minute period, were scored after the complete observation period. This score represented their maximal score, e.g. the number of correct pieces. For the first three toys (ball, xylophone and car) a different procedure was followed. The play sessions with these toys were divided into 10-second intervals. For each interval, the participants received a score ranging from 1 to 7 and a mean score was calculated over all intervals. All participants received the first five toys (ball, xylophone, car, blocks, and shape box). Since we did not want to discourage the children by providing them toys that were well above their level of play, only when a child showed a POS score higher than 4 on at least three out of five toys, were offered the last four toys. A mean score over all objects that were provided to them was calculated to obtain a general mean score for the cognitive level of play performance. If participants improved or deteriorated over the course of the three measurements, resulting in differences in the number of toys provided for each measurement, it was decided to calculate the mean score of only the first five toys. Therefore, differences in total scores, thus also in mean scores, were not due to the more or less play opportunity's given.

The internal consistency of the POS was good (Cronbach's alpha =.93). In order to determine the inter-observer reliability for the POS, two independent observers scored 10 videos of the test. Their inter-rater agreement was good for all toys and Cohen's κ ranged from .75 to 1.00.

Assigning participants to the appropriate level of play-material. Before starting

the intervention, all participants were assigned to a level of specific play-materials that matched their initial cognitive level based on their first scores on the POS (see above). Choosing toys that matched the participants' abilities ensured an optimal starting point for challenging the participants to elaborate their play skills. Criteria for assigning participants to the four levels are displayed in Appendix G.

In total, there were 14 participants assigned to level 1 (43,8%), 5 participants to level 2 (15,6%), 6 participants to level 3 (18,8%) and 7 participants to level 4 (21,9%).

Assessment of therapy integrity. During the fifth COPI-session the integrity of the therapy was assessed by means of the Therapy Integrity Scale, measuring the extent to which the intervention was implemented according to the agreed upon procedure. Important elements of the therapy were defined as: 'Creating a positive atmosphere', 'Being attentive to get the most out of the child', 'Trying to elicit a higher level of play by challenging the child', 'Giving the child the opportunity to show initiative', 'Supporting the child according to the agreed upon steps (including holding back when a child can perform an action by him/herself)' and 'Acknowledges and rewards child when showing a higher level of play'. The therapy sessions were divided into 2-minute intervals. For each interval, the child care worker received a score ranging from 1 to 5, with a score of 1 referring to hardly ever shown (0 – 20% of the time) and a score of 5 referring to always shown (80-100% of the time). A mean score was calculated over all interval and a sum score of all elements was calculated to obtain a general score for the integrity of the therapy.

The internal consistency of the Intervention Integrity Scale was acceptable (Cronbach's alpha =.83). In order to determine the inter-observer reliability, two independent observers scored 10 videorecordings of the COPI sessions. Their inter-rater agreement was good for elements of the therapy, Cohen's κ ranged from .64 to .83.

Design

To assess the effects of COPI a pretest-posttest design with a matched control group was used. Matches were created for both the residential as well as the day care group based on participants' initial cognitive play performance as measured by the POS pre-test.

Matched participants were randomly assigned to either group. Following the first POS observation, group 1 then received 10 COPI sessions whereas group 2 did not. After the first group received 10 training sessions, the level of cognitive play performance was assessed again for both groups using the POS. After this assessment, group 2 started to receive the 10 COPI sessions while group 1 no longer received COPI. After completing the 10 sessions, the level of cognitive play performance was assessed for both groups one last time for all, measured by the POS post-test. To investigate maintenance of therapy gains during the training, group 1 also received one more COPI session during which the LIPS and LOSS were again assessed.

During all periods children followed their normal daily routine and received care as usual. The daily routine of the participants and the care that they usually received varied depending on developmental needs of the children. Participants with motor disorders received Conductive Education (CE) in the morning (N=18) to stimulate their daily independence (Mulder, 2016). Others, who were on estimated to be on a slightly higher cognitive level, participated in school-like activities (N=5). In the afternoon, some of the participants received a different intervention Multi-Sensory Story Telling (MSST) (N=14), to stimulate their sensory development and social reactivity (Slange, 2016). Those who did not participate in this program were either given their own free time or participated in vocational activities (e.g. gardening).

To study the maintenance of cognitive growth from previous year's progress, a long-term follow-up POS measure was done after 9 months with a lower frequency of COPI

sessions (approximately once a week). The cognitive growth was measured by the POS consisting the same nine toys that were also used at the last POS measurement, 9 months earlier.

Preliminary Statistical Analyses

Prior to testing the hypothesis, assumptions concerning normal distribution and sphericity have been tested over all variables used in the analyses. Measurements of the LIPS, LOSS and POS were generally normally distributed, but in some subgroups there were a few small deviations from normality. If significant effects were found in these subgroups, differences were also tested using non-parametrical analyses. This yielded similar results, so these data were not presented.

For analyses with N < 20, differences with $p < .10$ were also reported, as they may be significant in larger populations. For analyses with N > 20, differences with $p < .05$ were considered significant. Effect sizes were calculated by means of the partial eta squared (η_P^2).

Results are presented for the whole group, since no differences between the participants in the residential group and participants in the day care group were found. Moreover, analysis showed that being new to the study, differences in care (i.e. whether they received another intervention (CE or MSST) or participated in school-like activities), the assigned level of play material nor differences in fine motor skills predicted growth on the LIPS and LOSS or POS scores.

Results

Within therapy effects of the Cognitive Object Play Intervention

Level of independent play. To examine the effects of COPI, within group analyses were carried out to compare the level of independent play, measured by the LIPS, at three time points: during the first, fifth and tenth training session. Mean LIPS scores are displayed

in Table 1. In accordance to our expectations, analyses yielded a significant overall within subject effect in the mean levels of independent play, $F(2, 60) = 10.92$, $p < .001$, $\eta_P^2 = .27$, with a significant linear increase in independent play over de course of the intervention, $F(1, 30) = 15.46$, $p < .001$, $\eta_P^2 = .34$.

Level of support needed. Within group analyses were additionally carried out for the LOSS, at the same three time points. Mean LOSS scores are displayed in Table 1. As expected, analyses yielded a significant overall within subject effect in the mean levels of independent play, $F(2, 60) = 19.60$, $p < .001$, $\eta_P^2 = .40$, with a linear decrease in the level of support needed, $F(1,30) = 38.09$, $p < .001$, $\eta_P^2 = .56$.

Table 1

Mean scores on the Level of Independent Play Scale (LIPS) and the Level of Support Scale (LOSS) observed during the first, fifth and tenth COPI session

	LIPS (N=31)		LOSS (N=31)	
	M	SD	M	SD
Session 1	.29	.18	1.90	.63
Session 5	.34	.20	1.66	.64
Session 10	.41	.22	1.48	.65

Independent outcome measures by the POS

Experimental versus control group. Between group analyses compared the means of cognitive play performance for the experimental group (1) who received 10 COPI sessions, and the control group (2) who received care as usual, over the first half of the research period. Means are displayed in Table 2. As expected, a main effect for growth in cognitive play performance ($F(1, 26) = 9.88$, $p = .004$, $\eta_P^2 = .28$) as wells as an interaction effect of group (experimental versus control) and growth in cognitive play performance ($F(1,$

26) $= 4.37$, $p = .047$, $\eta_P^2 = .14$), was found. As hypothesized, growth over the first 5-week period was only seen for the group receiving COPI and not for the group receiving only care as usual.

Table 2

Cognitive Level of Play Performance Means as measured by the Play Observation Scale (POS) for the group receiving COPI in the first period and the group receiving COPI in the second period

	COPI first period		COPI second period	
	POS *(N=14)*		POS *(N=14)*	
	M	*SD*	*M*	*SD*
T1	4.41	1.24	4.41	1.11
T2	4.85	1.11	4.50	1.13
T3	4.85	1.07	4.85	1.05

Note. Measured T1= at start research period, T2= after the first 5-week period, T3= after second 5-week period (end of research period).

Intragroup comparisons. Secondly, the effects of COPI were examined by carrying out within group analyses comparing group 2's progress in cognitive play performance over the second half of the research period (T2 - T3), where they did receive the COPI sessions, to the baseline (T1 – T2) were they did not receive COPI.

A significant overall-, $F (2,26) = 10.83$, $p < .001$, $\eta_P^2 = .46$, as well as a linear-, $F (1,13) = 13.93$, $p = .003$, $\eta_P^2 = .52$ and quadratic, $F (1,13) = 3.78$, $p = .074$, $\eta_P^2 = .23$ effect was found. Post-hoc analyses showed that significant growth in cognitive play performance was, as expected, only seen over the second half of the research period ($p = .002$). These findings show that play performance of the participants only improved after the 5 weeks of COPI, and not during the baseline period.

Maintenance of the effects of COPI

      Short-term maintenance as measured by the LIPS and LOSS. To examine short-term maintenance effects within the therapy, the progress over 5 weeks of those who no longer received COPI (group 1) was examined. Means are displayed in Table 3. Analysing this follow-up revealed that there was no significant change in level of independent play as measured by the LIPS, nor a significant change in level of support as measured by the LOSS.

Table 3

Mean scores on the Level of Independent Play Scale (LIPS) and the Level of Support Scale (LOSS) observed during the tenth COPI session and a follow-up after 5 weeks without COPI

	LIPS *(N=18)*		LOSS *(N=18)*	
	M	*SD*	*M*	*SD*
Session 10	.39	.19	1.51	.65
Follow-up	.40	.17	1.59	.59

      Short-term maintenance as measured by the POS. To examine short-term maintenance of the therapy effects, group 1's progress over the second half of the research period (T2 – T3), where they no longer received the COPI sessions, was examined (see Table 2). Analysing progress in cognitive play performance revealed that there was no significant change in cognitive play performance, as measured by the POS. Means displayed in Table 2 additionally showed that over the second half of the research period (T2 – T3), cognitive play performance stayed exactly the same. We thus found a short-term maintenance of these achieved effects.

      Long-term maintenance as measured by the POS. To examine if the effects of COPI were still present after 9 months with reduced intensity of training sessions for both the residential and the day care participants, their cognitive play performance, as measured by the POS, was compared at two time points: at the end of last years' research period (T0), $M =$

4.27, SD = 1.05, and at the beginning of this years' research period (T1), M = 4.51, SD =1.23. Analysis showed that scores did not differ significantly from each other, indicating that cognitive play performance remained fairly constant after this period of time and effects of last years' COPI training were maintained. This was the case for both the participants who did not receive COPI 6 weeks prior to the 9-month training period (group 1 of the study of Mannaert & Van Beek, in preparation) and the participants who continuously received COPI (group 2 of the study of Mannaert & Van Beek, in preparation), as no interaction of growth over time and group was found.

Initial level of cognitive play performance

It was examined if the initial level of cognitive play performance (measured by LIPS 1, LOSS 1 and POS 1) predicted growth in cognitive play performance after receiving therapy (measured by changes in scores on the LIPS and LOSS as well as on the POS). Regression analysis revealed that only the initial level of cognitive play performance as measured by the POS (β = -.418, p =.027) influences growth in POS score after the COPI sessions (posttest – pretest). Participants with a lower initial level of cognitive play performance improved significantly more as opposed to participants with a higher initial level of play performance.

Integrity of the Therapy

The integrity of the therapy was examined halfway through the intervention period. As can be seen in Table 4, the therapy was half of the time to mostly implemented as intended with a mean sum score of therapy integrity of 21.07 (SD = 5.10) out of a maximum score of 30. More specifically, the mean scores of the integrity of the different intervention elements ranged from 2.54 to 4.28 (out of a maximum score of 5). This means that the

trainers were mostly to always attentive, half of the time to mostly creating a positive atmosphere, challenging the child, giving them opportunities to show initiative, supporting according to the scaffolding principles and mostly not to half of the time acknowledging and rewarding improvement in play.

In order to determine whether the specific elements of the therapy predicted growth in cognitive play performance, a regression analysis was conducted with the scores of the growth in play performance as measured by the POS (differences in scores between measurements directly before and after the therapy) as a dependent variable. Results showed that the sum score of the integrity of the therapy did not predict growth in cognitive play performance, neither did any of the specific elements of the therapy. The same applied when we controlled for the initial level of play.

Table 4

Range and mean scores on the Intervention Integrity Scale, observed during the fifth COPI session

	(N=31)		
	Range	*M*	*SD*
Positive atmosphere	1.00 - 5.00	3.65	1.16
Attentive to get the most out of the child	2.33 - 5.00	4.28	.82
Challenging the child	1.00 - 5.00	3.30	1.28
Opportunity to show initiative	1.75 - 5.00	3.97	.95
Supporting according to the scaffolding principles	1.67 - 5.00	3.35	1.18
Acknowledging and rewarding improvement in play	1.00 - 5.00	2.54	1.41
Sum score Therapy Integrity	11.75 - 29.80	21.07	5.10

Discussion

Purpose of current study was to determine the effectiveness of the Cognitive Object Play Intervention (COPI) in a residential home and its affiliated day care centres in South

Africa. The aim was to increase the cognitive level of play in children and (young) adults with disabilities. After previous research (Van Beek, Wijnroks, Flesch & Vermeer, submitted; Manneart & Van Beek, in preparation) found preliminary support for its effectiveness, a better measurement was used to study COPI's maintenance effect. Moreover, we investigated if the therapy was applied as intended and whether specific features of the intervention predicted cognitive growth.

Findings showed, that play performance again improved after 10 sessions of COPI. These positive results were found on all outcome measures and analyses, both during and outside the training sessions with medium to high effect sizes. Findings revealed that participants showed more independent play and needed less support from the trainer over the course of the intervention. Assessment of the cognitive level of play outside training by means of an independent test, using an untrained toy set and measured by the researcher without giving support, demonstrated that growth was only found after COPI and not during periods of care as usual (including participating in other ongoing interventions). These findings are in line with other studies that endorse structured play therapy for children with disabilities as beneficial (Brodin, 1999; Childress, 2011; Frey and Kaiser, 2011) and earlier assessments of COPI in the same residential home and its affiliated day care centres (Van Beek, Wijnroks, Flesch & Vermeer, submitted; Mannaert & Van Beek, in preparation).

Maintenance effects

Current research also studied maintenance of achieved results after a 5-week period in which the participants no longer received COPI. As recommended by Manneart and Van Beek (in preparation), the research not only measured maintenance by means of the POS but also by means of the LIPS and LOSS. As expected, results showed that the achieved effects of the COPI sessions on the participants' level of independent play, level of support as well as their cognitive play performance were maintained. Participants showed neither a decrease

nor an increase in their level of independent play, level of support and their cognitive play performance. Whereas various play interventions (Barton & Wolery, 2008; Kasari, Freeman & Paparella, 2006) and previous research of COPI (Mannaert & Van Beek) did not found adequate evidence for maintenance of improvement in play skills, we thus found a short-term maintenance of these achieved effects in both the trained situation and by means of an independent test, using an untrained toy set and measured by the researcher without giving support. This may have been facilitated by a long period of COPI previous to this year's study period. Maybe the old play skills learned in previous research periods, and maintained over the course of approximately a year, were more ingrained which may have enabled additional gains to be more easily maintained.

Next to short-term maintenance, long-term maintenance was studied. It was measured to what extend the results of COPI were still visible after 9 months of reduced intensity of COPI for a subgroup of the participants. Contrary to the expectations, results showed that cognitive play performance remained fairly constant after this period of time for all participants. It seemed that by continuing to give the therapy, although with reduced intensity, play levels could be maintained but not increased if COPI is provided at a low intensity.

Effect of initial level of cognitive play performance

Additionally, the effect of the initial level of cognitive play performance on growth in play skills was examined to get a better insight into which participants benefit most from the training sessions. In line with previous findings (Van Beek, Wijnroks, Flesch, & Vermeer, submitted), we found that participants with a lower initial level of cognitive play performance improved significantly more outside the training sessions, measured by means of the POS using an untrained toy set, without providing support, as opposed to participants with a higher initial level of play performance. These findings support the hypothesis that it is more

difficult to develop from constructive to pretend play, than from functional to constructive play. Additional support for this hypothesis showed that even though the participants with a higher initial level of play performance hardly increased on the POS after the COPI sessions, they did show an equal increase on measures of growth in play during the COPI training. During COPI the trainer was allowed to stimulate higher levels of play, possibly making progress in this range of play more likely. The objects used in the POS may not have easily elicited drama play, particularly because the researcher was not allowed to take any initiative for such actions if not initiated by the child first.

Integrity of the Therapy

Furthermore, we examined the integrity of the therapy and its relation with the progress in cognitive play performance. While the intervention generally was adhered by the trainers as intended, higher levels of play performance were insufficiently acknowledged and rewarded by the trainers. Hence future implementation of the intervention should attempt to improve the adherence of this element of the intervention by providing the trainers specific guidelines for positive reinforcement.

Secondly, results unexpectedly showed that none of the elements of COPI had a meaningful influence on the participants' progress in cognitive play during the independent test, nor did the sum score of the therapy integrity. The lack a relation between therapy integrity and the effect of the intervention is not a shortcoming specific to COPI alone, but an often considered weakness across the results of effectiveness studies of interventions (Perepletchikova & Kazdin, 2005). There are several explanations for this finding. A possible explanation could be that both average and high levels of therapy integrity would lead to an improvement of play skills, therefore not indicating a relation between these factors. Another reason could be that the lack of a relation was due to differences between both participants and trainers. For example, a trainer might adhere more to the methods of the intervention

with a participant who seems to be less likely to improve, while other trainers might be more motivated to adhere the intervention as intended when they believe that a participant is likely to show progress in play performance. As such, examinations of relations between therapy integrity and the effect of the intervention can yield misleading results (Webb, DeRubeis & Barber, 2014).

Strengths

A strong characteristic of COPI is that it was based on Vygotsky's scaffolding principles, Smilansky's theoretical model of play and incorporated recommended characteristics issued in previous studies (Malone & Langone, 1999; Majnemer, 2011; Liso, 2010; Frey & Kaiser, 2011). Moreover, in addition to previously mentioned success in improving the cognitive play performance disabled children and (young) adults compared to a control group, another strength of the present study is that these effects were not only considered to be significant but also relevant, as shown by the medium to high effect sizes. Finally, besides examining the effectiveness during the intervention period, generalization to other toys and maintenance over time, the current study also examined is the therapy was largely adhered as intended.

Limitations and future research

Opposite to these strengths, current study also has some limitations. Although COPI generally was implemented as intended, it seemed that the specific scaffolding principles of the trainers did not cause this growth. This raises the question of whether this growth simply the result is of providing participants with more opportunities for object play and encouragement irrespective of this structured stimulation by a trainer? Therefore, it would be recommended for future research to compare the effects of COPI to other play interventions in which stimulation is not offered according to the particular stepwise scaffolding principles of COPI, or by examining the effectiveness of COPI in multiple groups, while implementing

different features of the intervention in each group. Secondly, while the present study found a generalization effect to similar but untrained play material in a setting where free play was observed while not offering support, a possible 'spin-off' to other play activities during daily life, everyday skills or academic performance has yet to be investigated. Lastly, this study showed that it is, probably thanks to the specific and detailed protocol, possible to implement COPI for disabled youth and (young) adults in a developing country, where the educational level of the childcare workers is quite low. Future research should establish if positive findings of COPI can be replicated for similar children and (young) adults in other institutions and in other countries.

Conclusion

In summary, this research was designed to further investigate the effectiveness of a cognitive object play intervention for youth and (young) adults with disabilities in improving their play skills. The findings provided support for the hypothesised effectiveness of this intervention in terms of improvements in the cognitive play performance in the intervention context, generalization to other toys and maintenance of the effects, and thus in being more than a pleasurable recreational activity.

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Appendix A: Guideline Level of Encouragement for COPI

The guideline for encouragement is meant to adjust the play intervention to the different levels of development of the children so each child can benefit from it. If a child shows evidence of success, adult assistance should offer more scope for the child to assume greater independence. Conversely, given a child's frustration and error in accomplishing a task or achieving a desired goal, more assistance should be provided, and thus assistance should be increased (Wood, 1988; in Fu & Stremmel, 1993). The amount of time in seconds suggested in this guideline should be considered an estimate of the time needed to give the child the opportunity to show initiative before the trainer interferes.

Levels of encouragement

1. The toy is placed in front of the child, and the child receives positive reinforcement of every spontaneous interaction with the toy.

2. If the child does not interact with the toy at all (i.e. looking at it) for more than 30 seconds, the child will be given encouragement through words and/or pointing at the toy and positive reinforcement of every interaction with the toy.

3. If the child shows no interaction with the toy other than looking (like reaching for or touching it) at least 30 seconds, the child will be given encouragement through words or pointing at the toy and positive reinforcement of every interaction with the toy.

4. If the child looks does not respond to the verbal encouragement for at least 30 seconds, the trainer will model the appropriate behavior, after which the toy will again be placed in front of the child, combined with positive reinforcement of every interaction with the toy.

5. If the child does not respond to the modelling of the trainer for at least 30 seconds, the

trainer will physically help the child in playing with the toy by using hand- over- hand support, combined with positive reinforcement of every interaction with the toy.

6. Step 3, 4 and 5 can be repeated for each possible action the child can gradual perform with the toys.

Guideline level of encouragement: Schematic reproduction

- Starting position: toy placed in front of the child

    → 1.   No encouragement

If the child shows:

- No response to the toy

    → 2.   Encourage through words and/or pointing to look at the toy

- Looking at the toy AND THEN: no reaching for and touching the toy

    → 3.   Encourage through words

    → 4.   If it doesn't help, demonstrate to the child how to reach for it

    → 5.   If it doesn't help, physically help the child to reach for it

- Looking at, reaching for and touching the toy AND THEN: no picking up or moving the toy

    → 3.   Encourage through words

    → 4.   If it doesn't help, demonstrate to the child how to pick up or move the toy

    → 5.   If it doesn't help, physically help the child to pick up or move the toy

- Looking at, reaching for, touching and picking up or moving the toy AND THEN: no toy-specific action

    → 3.   Encourage through words

    → 4.   If it doesn't help, demonstrate to the child how to perform the toy-specific action

    → 5.   If it doesn't help, physically help the child to perform the toy-specific action

Appendix B: Toys COPI

Level	Piaget's Stages	Description of Toys					
		1	**2**	**3**	**4**	**5**	**6**
1	Functional- and some Constructive Play	Ball	Xylophone	Car	3 Pieces Shape Puzzle	Blocks	6 pairs Matching
2	Constructive- and some Drama Play	6 pieces Puzzle	Xylophone	Cooking Objects	Simple Shape Box	Wooden Blocks	8 pairs Matching
3	More complex Constructive- and Drama Play	8-12 pieces Puzzle	8-12 pieces Puzzle	Cooking Objects	More complex Shape Box	Wooden Blocks	9 pairs Matching
4	Complex Constructive and Drama Play	10 pieces Colour Puzzle	10-12 pieces Puzzle	Cooking Objects	Complex Shape Box	Wooden Blocks	Dominoes

Appendix C: Toys POS

1. Ball

Place the ball in front of the child and ask if he/she can play with the ball.

Observe what the child does with the ball. If the child initiates an

interaction with you (i.e. rolling or throwing the ball to you), participate in

the game. Otherwise, just observe the child.

2. Xylophone

The xylophone if placed in front of the child. Ask if he/she can make

some music with the xylophone and observe what the child does with it.

3. Car

Put the car in front of the child and ask if he/she car play with the car.

Observe what actions the child initiates. If the child pushes the car over to

you and wants you to push it back, participate in the game. Otherwise,

observe the child's actions for the entire period.

4. Wooden Blocks

Put the blocks in a row in front of the child and ask if he/she can build

something with the blocks. Observe which actions the child initiates with

them.

5. Shape Box

Put the shape box and the pieces in front of the child and ask if he/she can put the blocks inside. Observe if and how many pieces the child puts in the box by him/herself.

6. Matching

Place the game board and all cards "right side up" in front of the child and ask if he/she can match them. If the child does not seem to understand the game, show one card, then point to the pictures on the game board and ask which picture looks like the card you're showing. Otherwise, observe if and how many matches the child makes.

7. Puzzle

Put the puzzle and the pieces in front of the child and ask if he/she can make the puzzle. Make sure every piece is presented "right side up", but most of the pieces should be (slightly) rotated. Observe if and how many pieces the child puts in the correct holes by him/herself.

8. Colour and Shape Puzzle

Present the child the game board and all pieces "right side up" in front of the child and ask if he/she can match them. If the child does not seem to understand the game, show one piece, then point to the game board and ask what looks like the piece you're holding. Otherwise, observe if and how many pieces puts on the right spot by him/herself.

9. Doll accompanying Cooking Objects

Place the doll and the cooking objects next to each other in front of the child, so that the child is able to see all objects. Ask if he/she can play with the doll and observe what the child does with the toys.

Children who are limited in their play because of obvious physical handicaps can receive help from the instructor. For example, if it is too difficult to pick up a puzzle piece and put it in the correct hole, the child can point to the puzzle piece and the hole the piece should be placed in, after which the instructor can carry out the action for the child. But only exactly those pieces the child is pointing at.

Appendix D: Level of Independent Play and Level of Support Coding Sheet

Name of Child: Unit: Session:

<u>Toy 1</u>

		Action							
	Score	1	2	3	4	5	6	7	8
Independently	0								
Verbal Support	1								
Modelling	2								
Hand-over-hand Physical Support	3								
No action	4								

Possible Actions: Number of Independent Actions: Score of Support:

<u>Toy 2</u>

		Action							
	Score	1	2	3	4	5	6	7	8
Independently	0								
Verbal Support	1								
Modelling	2								
Hand-over-hand Physical Support	3								
No action	4								

Possible Actions: Number of Independent Actions: Score of Support:

Mean Number of Independent Actions (LIPS): _____

Mean Score of Support (LOSS): _____

Appendix E: Play Observation Scale

Toy	0	1	2	3	4	5	6	7
1. Ball	No action	Looking/ Reaching	Touching/ Holding	Picking up/ Squeezing	Rolling	Rolling back & forth between two people	Throwing the ball	Throwing the ball & catching
2. Xylophone	No action	Looking/ Reaching	Touching/ Holding stick	Picking up stick or xylo-phone/rolling xylophone	Making sound without the stick	Making sound with the stick (on purpose)	Making music (tone)	Making music across from left to right
3. Car	No action	Looking/ Reaching	Touching	Picking up/ Moving a bit	Rolling	Rolling back & forth between two people	Play driving	Play driving and making sound
4. Wooden Blocks	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
5. Puzzle box	No action	Looking/ Reaching	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

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If they attain a score higher than four on at least three different toys, proceed with the rest of the toys, otherwise stop the test here.

6. Matching Game	No action	Looking/ Reaching	Touching	Picking up	Search for matches	Find 1-3 matches	Find 4-6 matches	Find 7-8 matches		
7. Puzzle	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		
8. Colour and shape puzzle	No action	Looking/ Reaching	Touching	Picking up a piece	Search for matches	Put 1-3 pieces in the right spot	Find 4-6 pieces in the right spot	Put 7-8 pieces in the right spot		
9. Doll	No action	Looking/ Reaching	Touching	Moving objects from one spot to another without purpose	Shows 1 action with only one object (e.g. pretend to eat a vegetable themselves)	Shows 1 action with multiple objects (e.g. pretend to let the doll eat a vegetable, or pretend to eat themselves with two different spoons)	Shows 2 or more unrelated, different* actions with the objects (e.g. hug the doll and chop some food)	Shows 2 related, different* actions with multiple objects (e.g. feed the doll and wipe his mouth with the towel afterwards) OR Shows 2 or more related, different* actions with one object (e.g. pretend that the doll walks, talks to the doll and makes him sit down)	Shows 3 related, different* actions with multiple objects	Shows more than 3 related, different* actions with multiple objects

Appendix F: Play Observation Scale Coding Sheet

Name of Child: Unit: Free Play Session:

1.	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		

2.	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		

3.	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		

4. Blocks	Total
Score	

5. Shape box	Total
Score	

6. Matching	Total
Score	

7. Puzzle	Total
Score	

8. Colour and shape puzzle	Total
Score	

9. Doll	Total
Score	

Total: _____   Mean: _____

Appendix G: Assessment of Level of Play Material

The four levels differed in cognitive complexity of required actions and the stage of play according to Smilansky's classification. Level 1 comprised toys mostly eliciting functional and some constructive play, whereas level 2 toys had a higher level of complexity and mostly eliciting constructive but also some simple drama play. Toys of play-material level 3 were again more complex than in level 2 and should elicit more complex constructive play and drama play. Last, level 4 toys were the most complex and should elicit even more complex constructive and drama play.

Table 1

Classification system to assign participants to the appropriate level of play-material

Play material Level	Scores on the Play Observation Scale (POS)	Indicated cognitive level of play
Level 1	≤ 4 on at least 3 toys	functional play, some constructive play
Level 2	> 4 on at least 4 toys	constructive play, some drama play
Level 3	≥ 5 on at least 5 toys	more complex constructive play & drama play
Level 4	> 5 on at least 6 toys	complex constructive play & complex drama play

Appendix H: Therapy Integrity Scale

Trainer:		Unit:				1= Never (0 – 20%) 2= Mostly not (20 – 40%) 3= Half of the time (40 – 60%) 4= Mostly (60 – 80%) 5= Always (80 – 100%) N/A	
Child:		Date:					
Time used:							
Motivational	0 – 2 min	2 – 4 min	4 – 6 min	6 – 8 min	8 - 10 min	10-12 min	M
1. Does the trainer create a positive atmosphere?							
2. Is the trainer attentive to get the most out of a child?							
Therapy elements	0 – 2 min	2 – 4 min	4 – 6 min	6 – 8 min	8 –10 min	10-12 min	M
3. Does the trainer try to elicit a higher level of play by challenging the child?							
4. Does the child get the opportunity to show initiative?							
5. Is help (if any) adapted to the child according to the agreed upon steps and held back when a child can perform an action by him/herself?							
6. Does the trainer acknowledge and reward it when a child shows a higher level of play							

1. Creating a positive atmosphere is seen as the trainer trying to make the child feel comfortable (so he or she can explore the environment and in this case the toys). Having a positive facial expression, making eye contact, communicating with the child and/or using positive physical contact is considered to be part of creating this atmosphere.

2. With 'attentive to get the most out of the child' it is meant that the trainer notices and alters it when something in the environment is not optimal for the child. The trainer can for example move toys closer when they aren't within reach for the child, help the child physically when he/she has trouble reaching or grasping the object or alter the way of sitting

in a wheelchair or at the table. This also includes the trainer trying to keep the child's attention to the toys to keep/get him or her to be engaged in the training. When a child is distracted, a trainer can for example use comments or signs to get his/her attention back on the object.

3. By trying to elicit a higher level of play, it is meant that the trainer stimulates and challenges the child to show his/her full potential instead of being pleased with the play the child already shows without this stimulation. This can for example be seen as the use words to encourage a child to show more or more difficult play, but also encouraging him/her to copy modelled (more difficult or different) play.

4. It is seen as an opportunity to show initiative when the trainer lets the child try him/herself for some time before interfering.

5. Is help given according to the agreed upon steps means that the childcare uses the steps that were derived from Vygotsky's sensitive assistance to tailor the help given to the specific needs of children. These steps consist of letting the child try him/herself first. When needed the trainer can then use verbal and nonverbal encouragement to get the child to be able to perform the task. If more help is needed, the child should get a demonstration of the appropriate play behaviour (modelling). Lastly, hand- over- hand psychical help can be given to the child by the trainer. This way the more independence and initiative a child demonstrates, the less assistance will be given. Help should then also be held back when a child can perform an action by him/herself. This means that, according to Vygotsky's scaffolding principles, the experienced other (here the trained childcare worker) gradually removes the given support when the child can master the task independently. This way children are still provided with enough freedom to learn to play independently and new concepts and knowledge can be internalised.

6. 'Acknowledge and reward it when a child shows a higher level of play' can be seen as the use of signs (thumbs up, clapping, giving a hand, high five or pat on the back), vocal or facial expression of endorsement when a child shows play that corresponds to a higher level of play as seen on the hierarchy of play on the paper accompanying the toys.

Appendix I: Assessment of Fine Motor Skills

Fine motor skills were assessed by observing reaching or grasping skills participants showed for 3 objects differing in shape and size. On account of these observations participants received a score corresponding to their highest performed level of fine motor skills. Possible scores range from no reaching (0) to superior grasping (6), as displayed in Table 2. For the total group of participants mean scores over the 3 objects ranged from 2.33 to 6.00 with a mean score of 4.57 ($SD =.75$). The inter-observer reliability of the fine motor scale has been computed and was excellent (Cohen's $\kappa = 1.00$).

Table 2

Ways of reaching and grasping

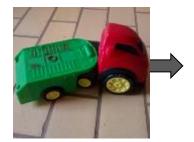|	
0.	No reaching
1.	Reaching, but no contact
2.	Contact only (no grasping)
3.	Primitive squeeze: palm and fingers enclose the object
4.	Hand grasp: claw-like move from above, with fingers and thumb in a parallel position
5.	Inferior pincer grasp: grasping with a stretched thumb and several fingers
6.	Superior pincer grasp: grasping with a bended thumb and forefinger

Appendix J: Adjustments to Toys

COPI

The specific objects used during the COPI sessions were slightly different from objects used in the POS, for example a frying pan was offered to the participants during the COPI, but a cooking pot was offered during the POS (see below). Moreover, the participants during the COPI sessions the children had the opportunity to interact and act out roles with the trainer, whereas they received a doll during the POS in absence of the trained childcare worker. As a result, the participants were not able to perform the exact same actions that they were taught to do by the trainer, thereby placing higher demand on their own fantasy and thus their drama play instead.
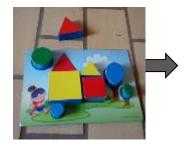
POS

1. Car

The car was replaced by a different looking car, which was more likely to elicit more drama play.

2. Colour & Shape puzzle

The colour & shape puzzle was swapped for a different version of the same game.

3. Doll

The doll and accompanying bathing objects (among others a bathtub and towel) was replaced by the same doll but this time accompanied by cooking objects (among others a vegetables and a spoon). This resembled an everyday dinner situation recognizable for all participants, but also provided them an opportunity to show even more complex drama play compared to the doll accompanying the bathing objects, since there were more materials and therefore more ideas for play possible.

Appendix K: Adjustments to Instruments

<u>LIPS and LOSS</u>

During the COPI training sessions some children did not perform one or more actions with the objects independently nor with support of a trained childcare worker. During previous research (Manneart & Van Beek, in preparation) this was always scores as "No action" (see Appendix D), resulting in low scores on their level of independent play, as measured by the LIPS, and high scores on their level of support, as measured by the LOSS. However, sometimes these actions were not elicited by the trainer (i.e. because the child performed an action on a higher level independently or the trainer stimulated the child to play on a higher level of play). Therefore, the scores on the LIPS and LOSS did not adequately reflected their level of independent play and level of support.

The current study excluded the actions that were not elicited by the trainers from the number of possible actions. To determine the level of independent play and the level of support, the number of independent actions and the score on support were both divided by the number of possible actions.

Moreover, if a child did not show an action during the 5th and/or 10th session that was performed independently during an earlier session and additionally showed at least one action on a higher level, it is decided that the child is able to do this action independently. In such case, the action is scored as displayed without support.

<u>POS</u>

Since the POS scoring system of the doll used in previous research (Van Beek & Manneart, 2015) was mostly based on the quantity and not so such on the quality of drama play, some adjustments were made to the doll's scoring scale. In contrast to the other eight

toys, which have a scoring system consisting of seven levels indicative for mostly functional and constructive play, the scoring system of the doll was extended to nine levels indicative for both functional and drama play: score 0 = *no action*, score 1 = *looking*, score 2 = *touching at least one object* and score 3 = *moving objects from one spot to another without purpose*, score 4= *one pretend action with only one object,* score 5= *one pretend action with multiple objects*, score 6= *two or more unrelated, different pretend actions with the objects,* score 7= *two related, different pretend actions with multiple objects or two or more related, different pretend actions with only one object,* score 8= *three related, different pretend actions with multiple objects* and 9= *more than three related, different pretend actions with multiple objects*. Score 1 is considered an indication for attention, score 2 and 3 are characteristic for functional play, scores 4 and 5 represent two actions of constructive play and scores ranging from 6 until 9 all represent different levels of drama play, starting with the simplest form of drama play, gradually increasing in complexity based on the number of objects used and relations between the actions performed.