

Wellesley College Wellesley College Digital Scholarship and Archive

Student Library Research Awards

Archives

1-1-2013

Effects of a Pretend Play Intervention on Executive Functioning Tasks

Karina K. Chung

Aryanne D. de Silva

Follow this and additional works at: http://repository.wellesley.edu/library_awards

Recommended Citation

Chung, Karina K. and de Silva, Aryanne D., "Effects of a Pretend Play Intervention on Executive Functioning Tasks" (2013). *Student Library Research Awards*. Paper 5.

http://repository.wellesley.edu/library_awards/5

This Article is brought to you for free and open access by the Archives at Wellesley College Digital Scholarship and Archive. It has been accepted for inclusion in Student Library Research Awards by an authorized administrator of Wellesley College Digital Scholarship and Archive. For more information, please contact ir@wellesley.edu.

Effects of a Pretend Play Intervention on Executive Functioning Tasks

Karina K. Chung

Aryanne D. de Silva

Wellesley College

Abstract

How self-transformation through a pretend play intervention affects executive functioning performance was examined in 32 preschoolers ($M_{age} = 51.10$ months, *range* 3-5 years). Children in the self-transformation condition were given a cape described as having special powers that made its wearer really good at playing games, whereas children in the control condition were given the same cape simply as part of the game. The main hypothesis was that children in the self-transformation group would outperform the control group on executive functioning tasks involving response inhibition and attention shifting. Results were significant for the fish/bear task ($p = .000$, $\eta^2 = .50$), and results headed in the expected direction for the other tasks. The secondary hypothesis, that self-transformation would have greater effects on response inhibition (head/toe and fish/bear tasks) than on attention shifting (card sorting task), was supported ($p = .003$, $\eta^2 = .32$). Results suggest that self-transformation may assist self-regulation and problem solving.

Effects of a Pretend Play Intervention on Executive Functioning Tasks

Pretend play is characterized by children's exploration and interpretation of the world in terms of symbols and images, and their capacity to understand different situations in an imaginary context (McAloney & Stagnitti, 2009). Although previous research has explored possible epiphenomenal implications of pretend play (Lillard et al., 2012), research is limited in describing how pretend play may affect children's behavior. Karniol et al. (2011) described the process of self-transformation through pretend play, as the mechanism through which children adopt the qualities of the character they are pretending to be. The goal of this study is to examine whether self-transformation through pretend play can improve performance on executive functioning tasks.

Previous research has emphasized two main perspectives on children's conceptualization of pretense as "thinking as if" or "acting as if," whereby children have either a mentalistic or action-based understanding of pretense (Ganea, Lillard, & Turkheimer, 2004). Karniol et al. (2011), however, can be interpreted as providing an alternative perspective on children's conceptualization of pretense through the process of self-transformation. The distinction between "thinking as if" and "acting as if" may not be as apparent in self-transformation. In self-transformation, children cognitively adopt the characteristics of the character they pretend to be, while they simultaneously manifest these different characteristics through their actions.

Self-transformation influences children both cognitively and behaviorally, and has been used successfully in clinical settings for a number of important developmental functions such as identity formation and a resource for problem solving (Rubin & Livesay, 2006). Although few studies have investigated self-transformation as a strategy to aid children's development, a recent study by Karniol et al. (2011) examined how self-transformation can assist children's delayed

gratification performance. Children who were given a superhero cape and told about Superman's special ability to wait, were able to wait longer on a delayed gratification task than both children who received only the prop and no information about Superman, as well as children who received only information about Superman and no cape. The authors concluded that children with the cape prop and instructions regarding Superman's ability to wait were able to undergo self-transformation, borrow traits of the superhero, and in turn, score higher on the delayed gratification task. In other words, self-transformation allowed children to adopt a character's patience, which most young children lack.

Delay of gratification requires one to inhibit the prepotent response to immediate gratification for the benefit of a delayed and perhaps more valuable reward (Karinol et al., 2011). Executive functioning is the ability to control one's actions and thoughts, including the ability to inhibit one's prepotent responses (Giancola, Godlaski, & Roth, 2012). Delayed gratification, therefore, involves executive functioning skills. If self-transformation can enhance children's performance on delayed gratification tasks, then self-transformation might also assist children's performance on more specific domains of executive functioning, such as response inhibition and attention shifting, which also require inhibition of a prepotent response.

Executive functioning involves adaptive, goal-directed behaviors that enable individuals to override more automatic or established thoughts and responses (Garon, Bryson, & Smith, 2008). Executive functioning is therefore especially critical in the first five years of life, as solving novel problems is a situation preschoolers often experience. Our study examines whether self-transformation through pretend play can influence executive functioning in preschoolers. We therefore hypothesized that preschoolers who engaged in self-transformation

through a pretend play intervention would perform better on executive functioning tasks than children who did not engage in self-transformation.

Two executive functioning skills are response inhibition and attention shifting. Response inhibition tasks test motor impulse control. For example, in the fish/bear task, children are instructed to listen only to the “nice fish” puppet and not the “naughty bear” puppet when given direct, Simon Says-like directions. Thus, response inhibition tasks involve remembering an arbitrary rule and responding accordingly, while inhibiting instinctive behavioral responses. Attention shifting tasks, on the other hand, test children’s ability to shift their focus from one characteristic to another, even if the latter characteristic somehow conflicts with the first. For example, in the card sorting task (Garon et al., 2008), children first sort a deck of cards according to one dimension (e.g., shape), and are then required to shift attention when asked to sort the same cards again according to a new dimension (e.g., color).

The process of delaying gratification requires the executive functioning skill of response inhibition, since delaying gratification requires one to inhibit the natural response of immediate gratification (Karniol et al., 2011). Therefore, if self-transformation can assist with delayed gratification, then perhaps self-transformation can also assist children’s performance on executive functioning tasks requiring the specific skill of response inhibition. A second executive functioning domain, attention shifting, also requires the skill of response inhibition. In attention shifting, children must first remember and then act on an arbitrary rule; consequently, children must also shift their attention to a second rule, while suppressing the instinct to act on the original rule (Muller, Dick, Gela, Overton, & Zelazo, 2006). Attention shifting tasks may therefore require greater cognitive flexibility than the response inhibition tasks, so we

hypothesized that self-transformation through pretend play would have a greater effect on response inhibition than on attention shifting.

Should self-transformation be an effective strategy for assisting children with executive functioning tasks, then perhaps there is potential for pretend play to be used as a strategy for assisting children with other executive functioning skills, such as those involving working memory. Furthermore, executive functioning is a skill set that preschoolers have not yet fully developed (Ponitz et al., 2008). Self-transformation, therefore, may also have important implications as a strategy for assisting children with other skills that they are at the cusp of mastering, such as theory of mind, social or spatial understanding.

Method

Participants

Children in this study were from a college laboratory preschool in a northeastern suburb of the United States. Participants included 32 children (16 girls and 16 boys, $M_{age} = 51.10$ months, $SD_{age} = 5.98$ months), randomized by condition (control or special cape), but controlled for gender and age. A majority of the children were of European-American background and from upper-middle class, well-educated families. Parental consent was obtained for all children.

Materials

A cape, two sets of attention shifting cards that varied on different dimensions, a fish puppet, and a bear puppet were used. To eliminate potential gender effects involving superheroes as typically-male figures, the cape used in this study was gender neutral. Additionally, the same cape was used for both the control group and the special cape group. For the attention shifting task, one set of four cards and two target cards, which varied on two dimensions (pattern and size)

were used for practice. A separate set of eight cards and two target cards, which varied on three dimensions (color, shape, number) were used for the actual trials.

Procedure

Data were collected in one session per child, which lasted approximately ten to fifteen minutes each. The experimenter and child sat across from each other, at a table in an empty room. Children in the self-transformation group were given a cape described as having special powers that made its wearer do really well at the types of games played that day. Children in the control group were also given the cape, but it was described as just part of the game. Each child then participated in three different executive functioning tasks: two response inhibition tasks (head/toes and fish/bear), and one attention shifting task (card sorting). The attention shifting task was a more verbal, but less physical task than the response inhibition tasks, and was therefore always conducted second in order to eliminate fatigue.

Head/toes task. In the head/toes task, children were told that the game was about opposites. Children were instructed to touch their toes when told to touch their heads and instructed to touch their heads when told to touch their toes (Ponitz et al., 2008). Up to six practice trials were conducted to ensure that children understood the instructions, and children were corrected if they made mistakes. Each of the ten tested trials was conducted (5 head and 5 toes) in the same randomized order. Each test trial was coded on a 3-point scale (0 = *incorrect body part indicated*, 1 = *correct body part eventually indicated*, 2 = *correct body part indicated*). The range of possible scores was 0-20.

Card sorting task. The card sorting task, (based on Frye & Zelazo, 1995), began with a practice round in which the experimenter showed the child two target cards, one with a large striped square and another with a small polka-dotted square. The child was then given four

sample cards that varied based on size (big or small) and pattern (striped or polka dots), and was asked to match them to the target cards. As the child performed the task, the experimenter noted the dimension (e.g., size) the child was using to sort. The experimenter then collected the set of four cards, and explained that the child was to sort the cards again, but this time by something different (e.g., pattern). In these two practice rounds, any sorting mistake was pointed out and corrected.

The experimenter then showed the child two new target cards, one with a yellow triangle and the other with two purple circles. The experimenter gave the child a new set of eight cards, which varied on different characteristics (color, shape and number) and reviewed the instructions for the task. The first round with the set of eight cards was not coded, so all sorting mistakes were pointed out and corrected. After completing the first round, the experimenter collected the eight cards and explained that the child was to sort the cards again, but this time, by something different. Mistakes were not corrected and children were told to guess if uncertain. In the final round, each card was coded on a 2-point scale (0 = *incorrectly matched*, 1 = *correctly matched*). The range of possible scores was 0-8.

Fish/bear task. In the fish/bear task, children were instructed only to listen to the “nice” fish, but not the “naughty” bear (Carlson, Moses, & Claxton, 2004). Up to four practice trials (given alternately by the fish and the bear) were conducted to ensure that children understood the instructions. Children were corrected if they made mistakes. Next, each of the ten test trials was conducted (5 fish instructions and 5 bear instructions) in the same randomized order. Each trial was coded on a 4-point scale (0 = *full commanded movement*, 1 = *partial commanded movement*, 2 = *wrong movement*, and 3 = *no movement*). Fish trials, however, were reverse-coded such that high scores indicated correct performance. The range of possible scores was 0-30.

After each practice round and in between tasks, children were given a reminder about the cape. Children in the self-transformation group were reminded that the cape had special powers which made its wearer really good at the types of games played that day. Children in the control group were told that the cape looked good on them. At the end of the session, each child with a special cape was told that we were just pretending that the cape had special powers, and that the experimenter was sure that the child would have done well, even without the cape. All of the children were thanked for their participation and offered a sticker.

Results

A total of four univariate analyses were conducted. The first univariate analysis combined the two response inhibition tasks. The remaining three univariate analyses compared scores of children in the special and control cape conditions on each of the three task totals. Age was controlled because preschoolers were in the process of developing the skills associated with the tasks used. T-tests comparing gender on each of the three tasks yielded no significant results, so gender was not included in subsequent analyses.

Combined Response Inhibition Score

The head/toes and fish/bear tasks both tested response inhibition, so a combined response inhibition score was calculated by summing the Z scores of the head/toes and fish/bear response inhibition tasks. A univariate analysis of variance found a significant difference between the combined response inhibition scores of children in the self-transformation group and in the control group, $F(2, 31) = 6.97$, $p = .003$, $\eta^2 = .32$. Children in the self-transformation group had significantly higher combined response inhibition scores ($M = 0.38$, $SD = 1.52$) than children in the control group ($M = -0.38$, $SD = 1.90$).

Individual Tasks

After comparison of self-transformation and control groups for the combined response inhibition score yielded significant differences, the two response inhibition tasks were separated for further investigation. Two separate univariate analyses were calculated for the two response inhibition tasks, and one univariate analysis was calculated for the attention shifting task. No significant results emerged for the univariate analyses comparing the head/toes and card sorting scores of children in the self-transformation group and the control group. However, for the fish/bear task, the overall model was significant, $F(2, 31) = 14.55$, $p = .000$, $\eta^2 = .50$ (see Table 1 for descriptives). For the fish/bear task, children in the self-transformation group performed significantly better than children in the control group, and performance improved with age.

Although the results of the head/toes and card sorting tasks were not significant, the difference in the means of the two tasks headed in the expected direction (see Table 1). Children in the self-transformation group scored higher than the children in the control group in both cases.

Discussion

The results from this experiment showed that self-transformation through pretend play were capable of influencing executive functioning performance in preschoolers. Self-transformation had a greater effect on the combined response inhibition tasks than on the attention shifting task. Children appeared to undergo self-transformation through pretend play when told about the cape's special powers. This self-transformation may have allowed children to enhance their executive functioning skills, which as preschoolers, they had not fully developed.

In our study, the effect was larger on response inhibition than on attention shifting, and upon further investigation, the results showed that the fish/bear task largely influenced this strong effect for response inhibition. Although the individual head/toes task was not statistically

significant, it was still able to support a statistically significant difference between the combined response inhibition score and the attention shifting score.

The response inhibition tasks, like the delayed gratification task in Karniol et al. (2011), required only one immediate cognitive step, whereby children restricted a singular automatic response. The attention shifting task, on the other hand, was more complex than the response inhibition and delayed gratification tasks. Specifically, the attention shifting task required several cognitive steps. Children not only restricted their immediate responses to familiar stimuli, but also changed their focus from sorting cards based on one dimension to another. The greater cognitive flexibility required of the attention shifting task may have been too difficult for children's self-transformation to be an effective strategy, compared to the limited cognitive flexibility needed for the response inhibition and delayed gratification tasks.

Comparing the results for each executive functioning task (head/toes, fish/bear, and card sorting) yielded a higher mean score for the self-transformation group than the control group, within each task. The means for each of the three tasks headed in the expected direction, suggesting that there is some element of self-performance enhancement at work. In the fish/bear task, the mean for the self-transformation group was significantly higher than the mean for the control cape group, suggesting that self-transformation was able to influence performance on this particular task. Perhaps the skills required for fish/bear were close to the lower end of the zone of proximal development, which made the task be manageable for the preschoolers. Age was a strong factor in children's performance. Even when controlled for, however, children in the self-transformation group still performed significantly better than children in the control cape group, suggesting that the process of self-transformation had the strength to surpass age effects.

Implications for our findings may be important for teachers, parents, and other adults who interact with preschoolers in a learning environment because pretend play has been shown to promote children's cognitive abilities. Whitebread, Coltman, Jameson and Lander (2009) found that pretend play aided children's problem solving skills and self-regulation. The idea that pretend play can promote children's cognitive abilities is not new. In one of the first articles discussing pretend play, Robinson (1920) detailed how pretense has a compensatory role in children, by allowing them to mentally achieve things normally deemed too difficult to accomplish. While engaged in pretend play, children are able to work through their anxieties and fears (Rubin & Livesay, 2006). Our study supports this body of previous research; we propose that although pretend play can aid in problem solving and self-regulation as a coping strategy, a pretend play intervention can also serve as a self-enhancement strategy for executive functioning skills. In addition, the effectiveness of self-transformation may be limited to tasks that are on the edge of children's capabilities.

Limitations

This study had two limitations. First, the degree of self-transformation could not be measured in this study since no such measures currently exist. Children in the control group may have therefore undergone self-transformation by pretending that the ordinary cape had special powers, even though such powers were not mentioned by the experimenters. Secondly, although mean scores in all three tasks headed in the expected direction, replicating this study with a larger set of participants would be beneficial both for potentially enhancing the significance of the results, and for broadening the understanding of this study's findings.

Future Directions

The results of this study showed that self-transformation through pretend play can play an active role in inhibiting prepotent responses, even in children as young as preschoolers. The potential connection between self-transformation and executive functioning performance in preschoolers is a relationship that warrants further investigation. Conceptually, the cognitive implications of this link are interesting, but more research is necessary in order to examine exactly why self-transformation works in the first place, and whether the vehicles of self-transformation vary based on context, such as in a game, school, home, or clinical setting.

Results suggested that self-transformation may be an effective strategy for children as they undertake tasks that are just beyond their capability. A method for strengthening this idea would be to see if self-transformation can assist with attention shifting tasks for older children whose abilities are more advanced. Research investigating an executive functioning scale of difficulty would be influential in refining what the boundary is for skills just out of reach of a child's capabilities. An executive functioning scale of difficulty would provide a quantitative measure illustrating the degree to which executive functioning could be affected by self-transformation. Examining this potential boundary would have implications not only for improving the understanding of executive functioning as a whole, but also for investigating the practical use of self-transformation as a self-enhancing, problem solving strategy. For example, a scale of difficulty and the potential boundary at which self-transformation is no longer as effective would be helpful for teachers, parents, and clinicians in determining what the specific capabilities and limits of a pretend play intervention might be.

References

- Ganea, P. A., Lillard, A. S., & Turkheimer, E. (2004). Preschooler's understanding of the role of mental states and action in pretense. *Journal of Cognition and Development, 5*(2), 213-238. doi:10.1207/s15327647jcd0502_3
- Garon, N., Bryson, S. E., & Smith, I. M. (2008). Executive function in preschoolers: A review using an integrative framework. *Psychological Bulletin, 134*, 31-60. doi:10.1037/0033-2909.134.1.31
- Giancola, P. R., Godlaski, A. J., & Roth, R. M. (2012). Identifying component-processes of executive functioning that serve as risk factors for the alcohol-aggression relation. *Psychology of Addictive Behaviors, 26*(2), 201-211. doi:10.1037/a0025207
- Karniol, R., Galili, L., Shtilerman, D., Naim, R., Stern, K., Manjoch, H., & Silverman, R. (2011). Why Superman can wait: Cognitive self-transformation in the delay of gratification paradigm. *Journal of Clinical Child and Adolescent Psychology, 40*, 307-317.
- Lillard, A. S., Lerner, M. D., Hopkins, E. J., Dore, R. A., Smith, E. D., & Palmquist, C. M. (2012). The impact of pretend play on children's development: A review of the evidence. *Psychological Bulletin*. doi: 10.1037/a0029321
- McAloney, K., & Stagnitti, K. (2009). Pretend play and social play: The concurrent validity of the Child-Initiated Pretend Play Assessment. *International Journal of Play Therapy, 18*, 99-113. doi:10.1037/a0014559
- Muller, U., Dick, A., Gela, K., Overton, W. F., & Zelazo, R. (2006). The role of negative priming in preschoolers' flexible rule use on the dimensional change card sort task. *Child Development, 77*(2), 395-412. doi:10.1111/j.1467-8624.2006.00878.x

Ponitz, C., McClelland, M. M., Jewkes, A. M., Connor, C., Farris, C. L., & Morrison, F. J.

(2008). Touch your toes! Developing a direct measure of behavioral regulation in early childhood. *Early Childhood Research Quarterly*, *23*(2), 141-158.

doi:10.1016/j.ecresq.2007.01.004

Rubin, L., & Livesay, H. (2006). Look, up in the sky! Using superheroes in play therapy.

International Journal of Play Therapy, *15*, 117-133. doi:10.1037/h0088911

Whitebread, D., Coltman, P., Jameson, H., & Lander, R. (2009). Play, cognition and self-

regulation: What exactly are children learning when they learn through play? *Educational and Child Psychology*, *26*, 40-52.

Table 1

Means and Standard Deviations for the Executive Functioning Tasks by Condition

Condition	Task					
	Fish/Bear		Head/Toes		Card Sorting	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Special Cape	27.44	5.68	14.38	6.57	2.56	3.41
Control Cape	25.13	6.20	11.94	6.51	2.25	3.15

Note. Only the means for the fish/bear task were significant at the $p < .05$ level