

What drives symbolic development in young children (2-4 Years): Understanding the processes linked with using replica objects as symbols

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ABSTRACT

The development of symbolic faculties in children is an outcome of corresponding processes which support the epistemological explorations in children. From around their second birthday, children start using objects as substitutes or symbols for something else. The aim of this paper is to review and discuss the processes linked with children's symbolic understanding about replica objects. Much is required to explore in this area in relation to attainment of dual representation, executive functions and children's developing social understanding. This has lead us to explore, at the ages 2-4 years, related processes that evolve and actively guide the course of children's developing symbolic skills.

Key Words : Symbolic development, Young children, Dual representation, Executive functions, Social understanding

INTRODUCTION

According to Alibali and Siegler (2000), A particularly important characteristic of children's thinking is that it is constantly changing. How children think at particular points in development is interesting in and of itself, but even more central for understanding cognitive development are questions of what changes occur and how the changes occur (p.3).

Beginning at age 2, it is intriguing to see children performing conventional actions like stirring, putting in and pouring on a kitchen set given to them, actions that are a result of careful observations of real objects. They are quick to identify and label the familiar replicas or objects. It seems as if they are not able to hold themselves back and want to make the best of any task given to or chosen by them. Later, this play with replicas advances to objects which are used as substitutions for something else which is not so obvious, but may have some functional similarities that are detected. An example from an encounter with young children living in the hills of rural Himachal Pradesh can be useful here. While playing

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the children used plant leaves as money to 'buy' things. It is very interesting to understand the process which leads children to use objects in a symbolic manner. According to Elder and Pederson (1978) the early acts of symbolic actions with objects are usually done with replica objects in the second half of the second year, followed by neutral objects (Rakoczy *et al.*, 2005b). The literature on children's pretense has demonstrated that pretense in the presence of real objects shows a developmental progression from employing object substitutions that are physically similar to the referent (using a pencil to stand for a mike) to employing objects that are dissimilar to the referent (using a box to stand for a mike) (Bretherton, 1984; Lillard, 1993). This perception of physical similarity between a symbol and its referent is especially important for young children who are less symbolically experienced (Anderson *et al.*, 1991). It thus becomes imperative to understand the role of replicas in facilitating early symbolic capabilities of children.

In the 20th century, the legendary developmental theorist Jean Piaget (1952) popularized the idea of viewing cognitive development in terms of sequential changes. His theory of cognitive development clearly describes that children's thinking progresses through certain stages. There are qualitative changes and children also make transition from one stage to another on many concepts simultaneously. Being scientists of developmental psychology, we understand that development is an interplay of many processes which interact with and support each other. Coupled with the innate capabilities of children, it is also the contexts that influence and guide the course of development for each child particularly. The development of representation remains a fundamental issue in our understanding of cognitive development. In today's world, it is unavoidable to escape representational mediums as children start dealing with pictures, books, objects and replicas very early in their lives. Further research is needed to clarify the processes underlying developmental shifts in representational knowledge. This paper explores symbolic understanding in relation to ability of dual representation, executive functions and children's developing social understanding.

Dual representation :

Replicas are three dimensional objects which pose a challenge of dual representation for children. They are the exact copies or models of objects and also a separate entity representing while representing its referent. The referential nature of replicas and objects is not very obvious to young children. Tomasello *et al.* (1999) found that 18- month- olds showed no skills in using replicas as symbols even when the representational relation was most straightforward. That means they could not identify the symbolic aspect that a toy hammer is a denoting symbol of a bigger hammer, whereas they could identify the gesture of using a hand as a hammer and made the correct choice. The 26-month-old children were good at identifying gestures and took relatively more time to decide for objects, showing difficulties with using objects as symbols. In a recent study, infants' transfer of information from pictures to objects was tested by familiarizing 9-month-olds with either a color or black-and-white photograph of an object and observing their preferential reaching for the real target object versus a distractor (Jachens and Shinkey, 2014). Using habituation as a criterion, this study provided evidence that a child as young as 9 months could create representation of an object from a picture and use it to guide action with the real object in a

preferential reaching task. Previous studies have shown iconicity and a realistic picture as a basis of children's learning from object to picture (DeLoache, 2011; Ganea *et al.*, 2008). Children from 15 to 18 months of age were able to understand referential nature of a picture to object transfer. Therefore, children are more skilful when it comes to learning from pictures and gestures, as they do not pose the challenge of dual representation. DeLoache (2000) explains dual representation as the ability to mentally represent both the symbol and its relation to its referent; simultaneously one has to be knowledgeable about objects. While dealing with replicas, young children face multiple challenges in appreciating its concrete and symbolic aspects simultaneously. Consequently, "interacting with the replica as an object blocks the child's appreciation of its symbolic function" (DeLoache, 2004). Children face difficulty in appreciating referential nature of objects. In an early research program, DeLoache (2000) developed a paradigm in which she hid an object in a scale model of a larger room to see if children could use what they knew about the hiding event in the model to find a bigger form of that model in the larger room.. She observed that children who were 2 years and 6 months unexpectedly failed this task and concluded that the problem was not a failure of memory, but of symbolic understanding (DeLoache, 2000). According to DeLoache (2004) it involves a failure of dual representation: children cannot maintain the distinction between a symbol and its referent. Gibson, Gregory, Ittelson, and Potter (DeLoache, 2000) outlined that symbolic artifacts have a 'dual reality' in that they have both a concrete and abstract nature. They are real objects and at the same time they stand for something other than themselves. In another famous 'The credible shrinking room' study, DeLoache (1997) created a situation where children believed that the model with a hidden toy is a large room that had been shrunk; they could easily find the hidden toy. The correspondence between the two spaces was not symbolic anymore and it didn't put the challenge of dual representation. These findings highlight that it was not just the mental task, but the ways in which it is constructed for the child that determines the outcome. The results of DeLoache's studies provide a conclusion that children of the ages 2years 6 months have difficulty achieving dual representation and treating a real object as a symbol of something other than itself.

Thus, it becomes imperative to study the relationship between an object and its referent. "The connection between an object being used as a symbol and its intended referent is also significant" (Tomasello *et al.*, 1999). Young children show difficulties in using objects and tools as symbols when they have other conventional uses (Casler *et al.*, 2011). One explanation could be children's early developing teleo-functional reasoning, where they see every object as stated by its purposeful feature (Casler and Kelemen, 2005 and 2007). According to Tomasello *et al.* (1999), another possibility could be a case of 'triune representation problem' where the child who sees an adult use a cup as a hat knows the cup as: (1) a physical object that can be grasped, sucked and manipulated; (2) an artifact conventionally used for drinking; and (3) a hat on this occasion because an adult used it this way (p.581).

Hence, in their initial attempts to understand symbols, children rely heavily on perceptual cues and conventional functions of objects. Later, older children become independent of functional properties and physical features of objects during their symbolic play (Ungerer *et al.*, 1981). Within the aspect of utilizing symbol-referent relationship, a child is putting efforts to use multiple representations in mind. This can be traced back to child's ability of forming

mental representations, beginning with object permanence and deferred imitation. Piaget articulates, “Due to the progressive detachment of the signs with respect to the immediate action for the benefit of mental combination, these images are liberated from direct perception and become ‘symbolic’” (1952, p. 355). Here Piaget is suggesting that cognitive development progresses in the realm of symbolic representation for a child. Vygotsky (1997) envisions symbolic play as a way for children to practice symbolically representing objects and events. So, the ability to understand and use symbols is an essential characteristic of development.

A recent research has placed the scale model task in the wider context of representational development. Murachver and Walker (2012) examined the relation between a scale model task and false belief. Although not related at 30 months, scale model performance at both 36 and 42 months predicted false belief performance six months later (at 42 and 48 months respectively). Kavanaugh and Lillard (2014) also examined the symbolic underpinning of theory of mind (ToM) providing evidence that understanding mental representations is a symbolic act that relies on a more general symbolic capacity. Perner’s (1991) theoretical explanations describe the scale model task as requiring the utilization of multiple mental representations; on the other hand, the false belief task requires a clear understanding of mental representations. These inquiries present an interesting position where the role of understanding symbolic aspects of an object is concealed.

Executive functions :

The efficient use of cognitive processes involves focus on the task at hand and also inhibiting ideas that are not useful in the ongoing task. Piaget’s A-not-B task is a classic example which requires inhibition of certain tendencies to achieve successful retrieval of hidden object. Do enhanced inhibitory capabilities permit new enduring memory for the new location? The development of executive functions is a gradual process in which children advance from impulsive, reactive responses to goal directed, self-regulatory behaviours (Bernier *et al.*, 2010 and Diamond, 2001). Growth in this region of the brain is rapid between 2 and 5 years of age (Diamond, 2001) and individual differences in executive function (EF) emerge between ages 2 and 3 (Carlson *et al.*, 2004). EF is a multidimensional construct with three distinct subsets of skills: inhibitory control, working memory and attention flexibility (Miyake *et al.*, 2001). Young children frequently encounter challenges to their EF skills, such as when they must overrule impulses and choose appropriate behaviours (Rhoades *et al.*, 2009). Scale error is one phenomenon where children override the size information and interact with miniature replicas as if they were full sized objects. This was assumed to be a result of their low inhibitory control, due to which they were not able to inhibit the activated motor routine associated with its larger counterparts (DeLoache *et al.*, 2004). Low inhibitory control in young children is well documented, and scale error as a result of momentary breakdown of inhibitory control needs deeper investigation (Carlson *et al.*, 2005; Zelazo *et al.*, 2008). It is argued that children’s performance on false belief tasks is also likely to be affected by inhibition deficits (Carlson *et al.*, 1998). Could it also be linked with children’s ability to understand and appreciate the symbolic aspect of replicas? Their encounters with objects gradually contribute to exhibiting appropriate behaviour with replicas, and undoubtedly their social environment may play a major role in guiding their natural inquiries. To get

pertinent answers, it is vital to investigate scale errors and representation abilities in children with different levels of inhibitory control.

Social processes :

There are many ways to assess children's mental abilities; however, it is the symbolic functioning of young children which has been considered a major indicator of cognitive development (Bretherton, 1984; Bretherton and Bates, 1985; Fein, 1981; Piaget, 1962). How does context play a role in the mental development of a child? Does children's developing social understanding contribute to their ability to symbolize? These questions have been the focus of many studies in psychology (Bruner, 1983; Rogoff, 1990; Vygotsky, 1978). For that reason, it is important to study the role of social processes in one of the most important facets of cognitive performance. Bruner (1990) maintains that the child does not enter this world as an isolated being, but rather as a participant in social processes. According to Vygotsky, "Human higher mental functions must be viewed as a product of mediated activity. The role of mediator is played by psychological tools and means of interpersonal communication" (1986, p. xxiv). Vygotsky (1978) highlighted the role of socio-cultural influences on children's cognitive development. His theory is advanced on the interplay of two 'lines of development' the natural line and the social historical line (Vygotsky, 1978). Development can be viewed as an apprenticeship in which children engage in the use of intellectual tools in socially structured activities with parents, other adults, and children through which they learn a great deal by observing and practicing (Rogoff, 1990). By virtue of being a part of a particular social and cultural milieu, children come in contact with artifacts and learn about their symbolic and referential nature from significant adults and peers. That means the development of representation insight requires an experience with symbols (DeLoache, 1995). Several studies have explored the possibility that that cultures promoting symbolic use of pictures early in life advance the knowledge of representational functions of pictorial symbols, and also children's ability to use pictures as a source of information about the world. (Callaghan *et al.*, 2012; and Ganea *et al.*, 2013). According to Tomasello (2000), the human adaptation for cultural learning is best seen ontogenetically and in the context of infant's other social and cognitive activities. The key transition occurs at the 9 to 12 months of age, as infants begin to engage in interactions that are triadic in the sense that they involve the referential triangle of child, adult and some outside entity to which they are both attending. Thus, infants at this age begin to flexibly and reliably look where adults are looking (gaze following), use adults as emotional referring point (social referencing), and act on objects in the way adults are acting on them (imitative learning)- in short 1 year olds begin to "tune in" to the attention and behaviour of adults toward outside entities (p. 37).

This observation informs researchers that children learn to perform symbolic actions, first beginning with gesture and language, and then with artifacts which include pictures, replicas and other objects. The basis of symbolic process is based on shared rules and practices (Rakoczy *et al.*, 2005b). These findings suggest that symbolic development is essentially a product of cognitive development and cultural processes.

Conclusion :

From the several examples presented here, it is evident that there are many underlying biological, social and cultural processes which contribute to children's understanding of symbolic aspects of replicas and objects. Young children face challenges to appreciate the symbolic aspects of objects and their experiences with symbols guide their symbolic skills. Some of the questions for future research are:

- To what extent young children attain the process of dual representation in cultures which differ in their use of symbolic mediums like pictures, replicas and artifacts?
- What are the challenges faced by children in appreciating symbolic aspect of objects in a low symbolic medium promoting culture?
- How does inhibition affect the process of symbolic development? Are scale errors related to low inhibitory control?
- How do scale errors occur in children 2-4 years of age?

A recent study suggests that villages of India have little exposure to pictures and symbolic systems as compared to children from villages of Canada who get extensive exposure early in their lives (Callaghan *et al.*, 2012). Children who have received minimal exposure to pictures in their early environments are less likely to exhibit an understanding of representational function as they have insufficient opportunities to learn cultural conventions. It was argued that delayed pictorial and pretense competence reported in Callaghan *et al.* (2011) was due to lesser cultural support for those symbol systems. The process of symbolic development in rural children needs to be addressed through active cross-cultural research in this regard. It would be far more interesting and challenging to study nuanced aspects of symbolic understanding of children in an Indian rural setting.

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