

Indicators of reflection during acquisition of symbolic actions in preschool Colombian children

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The background of the study is the historic and cultural conception of development, which considers symbolic activities significant for preschool-age children. Our objective was to identify indicators of reflection as an essential feature of preschool development during the acquisition of symbolic actions at three levels: materialized, perceptive, and verbal. The design of the study was descriptive with qualitative and quantitative analysis applied. Included in this assessment of the development of symbolic function were 180 children of preschool age (from 5 to 6 years old) who were in the third year of formal preschool education in Bogotá, Colombia. Qualitative analysis of the results pointed out specific indicators of symbolic development at each level. On the materialized level such indicators were the sequencing of actions with substituted objects, the generalization of the symbolic features of objects, and a verbal, coherent explanation of the mode of substitution. On the perceptive level the indicators were the generalization of features in graphic representations, the possibility of using an image as a strategy for voluntary memorization, and a verbal explanation of the use of an image as a substitution. On the verbal level reflective explanation of verbal substitution was established as the positive indicator. The results permit us to posit the usefulness of clear qualitative indicators for assessment of a child's level of psychological development and readiness for school learning at the end of preschool.

Keywords: symbolic development, preschool age, reflection, psychological development, actions with objects, symbolic actions

Introduction

Within the historical and cultural conception of development, signs and symbols are essential psychological instruments for transforming the psyche and the internal world of a child (Vygotsky, 1931/1983, 1982 /1993). Vygotsky stressed that the signs can be used, first, on the external social and material level and, second, on the

individual, internal, and ideal level (Elkonin, 2009; Quintanar & Solovieva, 2009). In other words, internal symbols may appear only after corresponding internal actions in which such symbols might be used (Vygotsky, 1983 /1995). Afterword, within activity theory, the regularities of acquisition and the types of orientation used for actions with symbols were taken into account during the teaching process (Talizina, 2009).

At preschool age the presence or absence of symbolic function may be observed within play activity. Collective forms the social role-play are specifically useful for the introduction of symbols at the external, materialized level (González-Moreno, Solovieva, & Quintanar-Rojas, 2014a, 2014b; González-Moreno & Solovieva, 2014a, 2014b). Interaction between adults and children within play activity may be observed in materialized, perceptive, and verbal symbolic actions. It is possible to suppose that the formation of symbolic actions follows the typical sequence of stages for the formation of mental actions proposed by Galperin (1966, 1998).

Materialized actions refer to the fact that the child starts to use material objects in a particular way: an object is used in external action as a substitute for another object, which is absent (or just not used by the child). The child may express orally the meaning of such a substitution. For example, a child using a pencil as a comb for a doll can express that he/she is combing the doll's hair using the pencil. The child learns to reproduce the models of actions with concrete objects, and by symbolic representation such models pass to a more generalized level.

Such types of actions may be called *symbolic actions*, which increase significantly within play activity. The child starts to use objects not only according to the external or functional meaning but also according to the new "denomination" (Petrovski, 1985). Such a change in the use of objects also means that the child has developed the internal, constant functional image of the corresponding object and may apply this image in new, "symbolic" situations.

In this process the operations with the object correspond to the proprieties of the "absent" object, which is represented within the current symbolic action. The whole process is accompanied by the gradual development of consciousness of actions and of the meaning of objects in different actions. Plays with rules and social role-play occupy an important place in psychological development. It is possible to suppose that the absence of these kinds of play activities or the lack of possibilities for being included in such activities has a negative influence on the acquisition of symbolic function at preschool age.

Later on, symbolic actions pass to the perceptive level, on which it is possible to accomplish substitution or representation of the object graphically. "Perceptive actions require ... the perceptual recognition of the elements and the comprehension of the images [that] are the symbols which may serve for the child and other people ... to represent objects and events, real or imaginary" (Salsa & Vivaldi, 2012, p. 135).

The level of verbal symbolic actions is the most complex at preschool age and includes the generalization of linguistic elements. A typical feature of this level is that a word has meaning and object reference (Luria, 1976). The word may be converted into a sign because it may represent not only the concrete object but also

the imaginative, symbolic object (an event, situation, feature, or action), which is not directly included in the meaning. In other words, each word has a polysemic structure that is not accessible to infants but can appear as a new, qualitative possibility at the end of preschool age. "Within the process of ontogenetic development the meaning of the words-signs is changing and its functions as well. Such changes proceed from simple denomination to complex media of abstraction" (Vygotsky, 1934 /1991b, p. 443). The meaning of the words acts as the unity within verbal symbolic actions.

During preschool age, gradual symbolic development on the materialized, perceptive, and verbal levels appears together with self-reflection. Such reflection indicates a more stable symbolic level and the possibility of flexibly using symbolic means. We can suppose that such flexibility of reflection may be related to the phenomenon of the interiorization of symbolic means (Vygotsky, 1982/1991a). "When external operation converts into internal operation, interiorization or the passage from external to internal level can take place" (Vygotsky, 1983/1995, p. 165). The presence of an indicator of reflection at three levels (materialized, perceptive, and verbal) shows the complex, gradual development of symbolic function, a process in which it is necessary to denominate particular ways of acting with objects as substitutes for other objects (images or words).

All these essential qualitative changes can take place at preschool age. "Symbolic function is essential for cultural activity and creates important conditions [for the] development of semiotic concentration of the means" required for posterior apprehension at school (Solovieva & Quintanar, 2012, p. 27). It is almost impossible to imagine learning concepts at school (Talizina, 2009) without the consolidation of symbolic function at preschool age.

At the same time, not all children show the same level of flexibility or reflection for using symbolic means. In our previous studies, poor acquisition of symbolic function at all levels was detected in groups of preschool children in Mexico and Colombia (Barreto, Bonilla, & Solovieva, 2013; Bonilla, Solovieva, & Jiménez, 2012; González-Moreno, Solovieva, & Quintanar-Rojas, 2011; Solovieva & Quintanar, 2013). At this age, qualitative indicators of the acquisition of symbolic function are important for psychological and pedagogical knowledge and assessment. For this reason, a goal of the present study is the identification of indicators of reflexive symbolic development in materialized, perceptive, and verbal actions at school age.

Method

Design of the study

The design of this study was descriptive. Our research was based on a qualitative conception of development and assessment and was concentrated on identification and analysis of typical parameters of psychological phenomena. The program MS Excel was used for the collection of data, and statistical analysis was provided by R Development Core Team (2014).

Participants

The participants in the study were 180 preschool Colombian children from 8 educational institutions in Bogotá. The age of the children was between 5 and 6 years, and all of them were in the third year of regular preschool. Four institutions were private, and the other four were public. Two types of institutions were selected because we were pretending to study general typical features of psychological development in educational preschool institutions at different levels. The institutions were located in different zones of the city and were selected on the basis of their agreement to take part in the research. Inside each institution the participants were selected by chance. Table 1 shows that all participants were distributed homogeneously according to gender and kind of institution.

Table 1. Characteristics of the participants according to gender and kind of institution

Genders	Kind of institution		Total
	Public	Private	
Girls	27%	22%	49%
Boys	28%	23%	51%
Total	55%	45%	100%

Table 2. Structure and content of assessment

Level	Task
Materialized symbolic actions	<ol style="list-style-type: none"> 1. The child is asked to propose a play with a pencil, in which the pencil may be used as "something else." 2. The child is asked to solve a problem in which "the cars cannot pass through the street because the roads are being repaired, and it is necessary to find special signs to prevent accidents." 3. The child is asked to propose signs to show "interesting places for recreation in the park." 4. The child is asked to determine and to say which of two tables is longer than the other and to use any object to measure the length.
Perceptive symbolic actions	<ol style="list-style-type: none"> 1. The child is asked to draw (create) pictograms for "angry teacher," "joyous party," and "a letter to mother about tasty food to prepare for Sunday." 2. The child is asked to draw the route from "home to the nearest shop or market." 3. The child is asked to draw "places in the town and mark the places with signs in order to remember the places." 4. The child is asked to "imagine a street and draw a sign that prohibits the movement of cars."
Verbal symbolic actions	<ol style="list-style-type: none"> 1. The child is asked to answer the question: How can we know whether one phrase (sentence) is longer than another? ("Nuestro país es Colombia" or "Me gusta jugar"). 2. The child is asked to answer the question: How can we know whether one word is longer than another? (automobile or train). 3. The child is asked whether a "cow" might be named a "cat" and why. 4. The child is asked to choose a character from a fairy tale and to tell the story in the "first person" on behalf of the chosen character.

Instrument of assessment

In order to assess materialized, perceptive, and verbal levels of the development of symbolic function, the protocol for qualitative evaluation was used. This instrument allows the evaluation of the performance of diverse kinds of actions of substitution in collaboration with the child (Solovieva & Quintanar, 2014). In other words, the instrument helps to evaluate the zone of proximate development, which in our case implies the possibility of the child's performing symbolic actions with the external help of an adult (Vygotsky, 1982 /1991b). External help for orientation implies the elaboration of the base of action. Such orientation allows the construction of the image of the present situation, the identification of the meaning of the whole situation (its necessity or sense for the subject) and its essential basic components, the elaboration of a plan for future actions, and the regulation of the execution of the action (Galperin, 1966, 1992). Table 2 presents the structure and the content of the scheme for evaluation of actions on the materialized, perceptive, and verbal levels (Solovieva & Quintanar, 2014).

Procedure

To begin, all private and public preschool institutions were contacted and informed about the aim of the research. The directors of the institutions and the parents were asked to agree to take part in the study.

The scheme of the assessment of symbolic function was applied to each child individually in one session of 1 hour duration. Afterward, the analysis of the obtained results was carried out in order to characterize the responses of the 180 children.

Each child was assessed by a student in the department of pedagogy or a student at the Ph.D. level in educational sciences (one of the authors of the article). Assessors registered all performances and oral expressions of the children. Additionally, three experts were present during the procedure with each child: two psychologists and one language pathologist. The goal of this procedure was to obtain objective opinions about the absence or presence of symbolic function at different levels in each child. We then established the degree of coincidence in the opinions of the experts. All experts were previously informed about the types and levels of actions used in the assessment. After observation, each expert, individually, established the presence or absence of symbolic substitution at each level. Video recordings were used in order to provide evidence of the whole procedure. The experts analyzed the obtained data to establish the statistical coincidence of their evaluations. The collection of the data was done by using MS Excel, and statistical analysis was provided by R Development Core Team (2014).

Results

Based on the children's performance during assessment, types of positive and negative responses were established (Table 3).

Table 3. Types of responses to the tasks for assessment of symbolic function in actions

Level	Tasks	Types of response	
		Positive	Negative
Materialized symbolic actions	Substituting another "imaginary" object for the pencil	<ul style="list-style-type: none"> *Substituting another object for the pencil in one action *Representing with gestures and sounds the action of substitution *Relating two actions to each other according to substitution *Sequencing actions of substitution *Inventing a symbolic play with the substitution of another object for the pencil *Reflexive substitution: the child explains the whole procedure of substitution 	<ul style="list-style-type: none"> *Direct and concrete usage only *Losing the goal of the activity *No response *No explanation of the actions *Simple manipulation of the pencil with no specific goal (absence of any action)
	Traffic signs	<ul style="list-style-type: none"> *Taking the initiative for finding traffic signs *Solving the problem using proposals from an adult *Reflexive explanation of the way of using signs in the task 	<ul style="list-style-type: none"> *Direct usage of chosen objects *No proposals for signs *No explanation for actions *Simple, unspecific manipulation with no goal *No answer at all
	Signs for places in the park	<ul style="list-style-type: none"> *Taking the initiative for finding signs in the park *Solving the problem using proposals from an adult *Reflexive explanation of the way of using signs in the park 	<ul style="list-style-type: none"> *Direct usage of chosen objects *No explanation for actions *Simple, unspecific manipulation with no goal *No answer at all
	How to know if one table is longer than another	<ul style="list-style-type: none"> *Proposing measuring the table with an object appropriate for longitude *Comparing ropes and determining the longest one (child thinks that the rope may substitute for the table) *Reflective explanation of diverse possibilities for and ways of measuring the table 	<ul style="list-style-type: none"> *Simple, unspecific manipulation with no goal *No answer at all
Perceptive symbolic actions	Drawing pictograms and letter	<ul style="list-style-type: none"> *The image produced by the child reflects the content of the words (pictograms) and the content of the letter *Usage of gestures and expressions corresponding to the image *Selection of a common symbol for expression of the content *Can explain what was drawn and why *Can remember what was drawn and why 	<ul style="list-style-type: none"> *Drawing does not correspond to the instructions *No explanation for the drawing *Can't remember what was drawn and why *Image cannot be recognized by the child or by any of the experts
	Drawing the route from home to the shop	<ul style="list-style-type: none"> *Drawing reflects the "route from the house to the shop" *Usage of gestures and expressions corresponding to the image *Selection of a common symbol for expression of the route *Can explain what was drawn and why *Can remember what was drawn and why 	<ul style="list-style-type: none"> *Drawing does not correspond to the instructions *No explanation for the drawing *Cannot remember what was drawn and why *Image cannot be recognized by the child or by any of the experts

Level	Tasks	Types of response	
		Positive	Negative
Perceptive symbolic actions	Drawing signs for places in the park	<ul style="list-style-type: none"> *Drawing reflects "places in the park" *Usage of gestures and expressions corresponding to the image *Selection of a common symbol for expression of places in the park *Can explain what was drawn and why *Can remember what was drawn and why 	<ul style="list-style-type: none"> *Drawing does not correspond to the instructions *No explanation for the drawing *Cannot remember what was drawn and why *Image cannot be recognized by the child or by any of the experts
	Drawing traffic signs	<ul style="list-style-type: none"> *Drawing reflects the traffic signs *Usage of gestures and expressions corresponding to the image *Selection of a common symbol for expression of traffic signs *Can explain what was drawn and why *Can remember what was drawn and why 	<ul style="list-style-type: none"> *Drawing does not correspond to the instructions *No explanation for the drawing *Cannot remember what was drawn and why *Image cannot be recognized by the child or by any of the experts
Verbal symbolic actions	How to know which phrase is longer	<ul style="list-style-type: none"> *Responds that the sentence is longer because it has more words *Responds that the sentence is longer because it has more sounds *Responds that it is necessary to count the words *Explains reflexively the correct answer 	<ul style="list-style-type: none"> *Responds in an incoherent way *Combines two phrases *Changes parts and words in phrases *Changes the order of words in phrases *Mentions just one part of the phrase
	How to know which word is longer	<ul style="list-style-type: none"> *Responds that the word is longer because it has more sounds *Responds that the word is longer because it has more letters *Responds that it is necessary to count the sounds *Responds that it is necessary to count the letters *Responds correctly and reflexively to the question 	<ul style="list-style-type: none"> *Responds incorrectly and chaotically *Combines two words *Changes the words *No answer at all
	Is it possible to call a cow a "cat"?	<ul style="list-style-type: none"> *"Yes, it is possible, it has horns and is a cow" *"The cow will not give milk, only the word is changing" *Reflective explanation of the whole situation: "If we change the word, the object will not change" 	<ul style="list-style-type: none"> *"Will not give milk" *"Will be like a cat and not a cow" *Incoherent speech production *No answer at all
	Telling the story "from the point of view of a character"	<ul style="list-style-type: none"> *Can tell the story from the point of view of a character chosen by the child *Correct usage of personal pronoun "I" in the story *Reflexive explanation about the selection and the purpose of the character 	<ul style="list-style-type: none"> *Can tell the story but not from the point of view of the chosen character *Incorrect usage of personal pronoun "I" in the story *Incoherent speech production *No answer at all

After identification of the diverse types of all the answers of the children, the results were classified according to the levels of symbolic development. This classification permitted us to establish indicators for the positive development of symbolic actions at the materialized, perceptive, and verbal levels (Table 4). During evaluation each expert assigned 0 or 1 to each observation (0 = no symbolic action observed; 1 = symbolic action observed) using formal protocols for each of the 180 participants.

Table 4. Indicators of symbolic function at different levels of action

Level	Indicators of reflexive symbolic development	Description
Materialized symbolic actions	Sequence of actions of substitutions	The child describes the sequence of actions with objects as substitutes and achieves actions of representation. For example, the child says that the pen is a “plane,” “it can move as a plane, can fly away, and can come back.”
	Generalization of the symbolic features of an object	The child generalizes the action and shows different ways of substituting. During representation the child uses features of the represented object instead of real features of a real object. For example, the child knows and can explain that the pen is a “plane” and produces the sound of the motor of the plane (rrrrr) while moving the pen.
	Verbal, coherent explanation of the substitution of one object by another	The child can give a coherent explanation of substitution. For example, “I know that this is a pen, but I can play and it seems that it is a plane and the plane can fly.”
Perceptive symbolic actions	Generalization of features in the produced picture (pictogram)	The child can graphically generalize essential features of an object.
	Proposed graphic symbol can be understood (recognized) by the child and by an expert	The drawing can be recognized by the same child later on and also by another person.
	The graphic image can be used by the child as a strategy for memorization	The child can remember his/her drawing and can explain its meaning.
	Verbal, coherent explanation of the proposal to create a drawing as a substitute for an object or situation	The child can explain the content of the drawing. The child can answer questions about the content and the elements of the drawing. For example, the child can answer such questions as “Where does this path start?” “How can we get to the shop from the house?” “Where does the path finish?”
Verbal symbolic actions	Verbal, coherent explanation of the whole solution Coherent story from the point of view of the character	The child can explain the whole answer. For example, the child can explain the chosen character and the whole story.

In order to establish the degree of coincidence of the evaluations of the children's answers by the three experts, Kendall's coefficient of concordance (W) was used (Kendall & Babington, 1939). The level of significance chosen for our analysis was 1%. In this case, if the p value of W is bigger than 0.01, the result is considered to be product of causality and is not significant statistically. However, if the p value of W is less than 0.01, the result is the product of intrinsic coincidence according to the experts and is statistically significant. It was determined that the three experts gave coincident evaluations of the responses of children at the level of 1% of significance (Table 5). In the table only positive responses are taken into account and not all types of responses of all the participants.

Table 5. Statistical analysis of indicators for the reflexive development of symbolic actions on different levels

Level	Indicator of reflexive development	Number of children	Percentage of responses	Interval		Kendall's W	P value
Materialized symbolic actions	Sequence of actions of substitutions	28	15.56%	10.75%	21.87%	1.00	0.00**
	Generalization of features of objects	21	11.67%	7.53%	17.49%	1.00	0.00**
	Verbal, coherent explanation of substitution of object	12	6.67%	3.65%	11.63%	1.00	0.00**
Perceptive symbolic actions	Generalization of the symbolic features for representation on the graphic level	17	9.44%	5.76%	14.93%	1.00	0.00**
	Use of the drawing as a strategy for memorization	16	8.89%	5.33%	14.28%	1.00	0.00**
	Recognition of the symbol by the child and by an expert	15	8.33%	4.90%	13.62%	1.00	0.00**
	Explanation of the image according to the task (situation)	11	6.11%	3.24%	10.95%	1.00	0.00**
Verbal symbolic actions	Coherent explanation and telling of the story	4	2.22%	0.71%	5.96%	1.00	0.00**

**Significant at 1%

Discussion

The purpose of our research was to identify indicators of the reflexive acquisition of symbolic function on the level of materialized, perceptive, and verbal actions. Analysis of the obtained data permitted us to conclude that for materialized ac-

tions indicators of reflexive development are the sequence of actions of substitution, the generalization of the symbolic features of an object, and an explanation of how the process of substitution was managed. For perceptive symbolic actions such indicators are the generalization of the symbolic features of the represented word (or situation) in the image, the use of the image as a means (strategy) for positive memorization, the recognition of the produced image by the child and by an adult, and the child's reflexive explanation according to the content of the task. On the level of verbal actions only one indicator can be distinguished; that indicator is the coherent explanation of and the production of an adequate story following the verbal instructions of an adult.

In our opinion, one of interesting findings of our study was the identification of indicators that might provide precise information for a psychologist about a child's level of functioning or initial acquisition of symbolic function. The results show that verbal regulation was present as an indicator of reflexive execution at the level of materialized actions. At the same time, an essential difference among the levels was that on the materialized and perceptive levels verbal regulation would not by itself be enough for efficient realization of the action of substitution. We can see that for only 4 children within the studied population was the verbal symbolic level accessible (Table 5). Such data permit us to suppose that the achievement of a high level of symbolic function (verbal level) at preschool age is possible only in connection with the previous positive development of symbolic external materialized and perceptive actions. Gradual use of these external means in plays and artistic activities is essential for positive qualitative psychological development (Vygotsky, 1926/2001). In our previous studies the levels of symbolic function were determined in assessed populations of Mexican and Colombian preschool children (Bonnilla et al., 2012; González-Moreno et al., 2011). At the same time, it is possible to confirm that specific orientation with the help of external signs and symbols proposed by an adult through group social role-play can guarantee positive changes in symbolic development in children between 5 and 6 years old (García, Solovieva, & Quintanar, 2013; Solovieva & Quintanar, 2012).

The complex level of symbolic development, the level of verbal actions of substitutions, can be characterized as the level on which words start to operate not only as a means of communication and regulation but also as a means of mental internal representation of phenomena and situations. Vygotsky (1931/1983) explained that "verbal actions modify the process of thinking and convert it into a verbal, conceptualized, and mediated process. At the same time, these actions permit [one] to precisely organize and orientate the perception, which converts to a selective, objective, and exact process."

As we mentioned, the presence of indicators of reflexive development at the level of verbal actions reflects the possibility of representation at a high level. One of the main difficulties pointed out in our study is the low level of symbolic development in the studied population, which confirms our previous findings. For example, only 15.56% of assessed children succeeded in realizing the sequence of actions of substitutions in reflexive materialized symbolic actions; only 9.44% showed some kind of ability in generalizing symbolic features on the perceptive level, and only 2.22% showed reflexive verbal development of symbolic actions. Thus, regular children with no evident developmental problems do not show a sufficient degree

of symbolic development at the end of preschool. The difficulties of reaching this benchmark increase from the materialized level to the verbal level. This situation indicates the necessity of reconsidering the strategies for pedagogical and psychological educational work in both private and public institutions (González-Moreno & Solovieva, 2014b). The common traditional strategy preschool educators use first of all is repetitive reproductive tasks such as repetition of vocalizations, numbers, and letters. Such tasks have nothing to do with the necessity of developing symbolic function in materialized, perceptive, and verbal actions. We are convinced that the best strategy for changing the present situation is by remembering and emphasizing preschool activities that involve social role-play (Elkonin, 1980; Solovieva & Quintanar, 2012) and all kinds of narrative-play (Bredikyte, 2011).

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