

## THINKING AND CONCEPTS: VYGOTSKY'S THEORY OF CHILD CONCEPT FORMATION

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### ABSTRACT

Children's thinking and concept formation would contribute to their creativity and capacity for problem solving. In this article, Vygotsky's theory of children's concept formation was discussed with respect to children's formation of synthetic images and thinking in complexes on their way toward to the formation of potential concepts and real concepts. Educators of young children may provide young children with developmentally appropriate services and activities such as play and drawing, which may be arranged in such a way that children's formation of thinking and concepts may be enhanced through the use of languages and other symbol systems not merely on their own, but under adult guidance or in collaboration with more capable peers as well.

**Keywords:** thinking; concept; image; symbol; language

### 1. INTRODUCTION

Children's formation of thinking and concepts with the aid of self-created and conventionally adopted signs and thinking skills is associated with children's creativity, problem solving, and learning performance (Helm and Katz, 2001; Vygotsky, 1978, 1986; Zachopoulou and Makri, 2005). From the pedagogical point of view, it would be developmentally appropriate to enhance children's learning and creativity through thinking and concept formation on their own. As stated in the 1999 report of the National Advisory Committee on Creative and Cultural Education, it would be the essence of teaching for creativity to provide instruction to young people in the forms which would encourage them to develop their own thinking or behavior (as cited in Jeffrey and Craft, 2004). With regard to human formation of thinking and concepts and the processes within human inner psychological operations associated with creative performance, Buhler presented the following description:

There are facts which warn us against overestimating the achievements of the chimpanzee. We know that no explorer has ever confused gorillas or chimpanzees with men. No traditional tools or methods of using them differing from tribe to tribe (which would point to the transmission from one generation to another of some invention) have ever been found among them. We do not know of any scratching in sand or clay, which would constitute a *representational drawing* or even a mere ornament scribbled playfully, nor of any *representational language*, i.e. sounds signifying names. There must be some inner reason for all this. (Vygotsky, 1986, pp. 72-73)

In processes of thinking and concept formation, human inner psychological operations, as asserted by

Vygotsky (1978), would be fundamentally changed by the use of artificial means just as the range of human activities would be limitlessly broadened by the use of tools, which would give rise to new and higher-order human psychological operations. As argued by Vygotsky, since human use of written signs to denote objects or actions would be merely first-order symbolism and second-order symbolism would take place when written signs are created to represent the spoken symbols of words, on the way of concept development, children need to learn how to use written signs to represent not merely things, but speech as well. To enhance children's capacity for symbolization and formation of thinking and concepts, Vygotsky urged that children's activities should be arranged from representing things to representing speech with the aid of such a representational means as drawing.

Children's use of speech and written signs plays a crucial role in their symbolization and formation of thinking and concepts. The transition of children's thinking formation to their formation of well-developed concepts was described from the perspective of children's use of speech and written signs in the following statements presented by Uznadze:

Thus, we see that the real concept corresponding to the upper level in the socialization of thought appears relatively late. At the same time, children start using words and establish a mutual understanding with adults rather early. This implies that words take over the function of concepts and may serve as means of communication long before they reach the level of concepts characteristic of fully developed thought. A special study should reveal the development of such forms of thinking, which are not conceptual, but which provide a functional equivalent of concepts. (Vygotsky, 1986, p. 101)..

## **2. THINKING IN COMPLEXES**

While numerous researchers have made great efforts to study various issues related to children's thinking and concept formation in their learning (Chen & Zhou, 2010 ; Helm and Katz, 2001; Wu, 2009, 2013), traditionally the methods of studying concepts, as Vygotsky (1986) stated, may be classified into two groups, one of which examines the concepts already formed by children with respect to the verbal definition of their contents and the other of which focuses on the psychic processes giving birth to concept formation and uses the study of abstraction. As pointed out by Vygotsky, concentrating on the word and coping with the final, finished product of concept formation, the first method often reproduce ready-made definitions and tend to disregard the sensory material, which would give rise to further psychological operations and concept formation, while the second one ignores the crucial role which the symbol would play in concept formation. Vygotsky asserted that a great step forward may be taken by combining these two methods in a new approach to understanding children's formation of thinking and concepts.

A new approach, termed the method of double simulation, was designed by one of Vygotsky's collaborators, Lev Sakharov and used in the experiment of Vygotsky (1986) to study the process of children's formation of thinking and concepts with respect to several developmental phases. In the experimental setting, nonsense words meaning nothing to the subject at first were introduced and each nonsense word was attached to a particular combination of object attributes with no ready concept and word to introduce artificial concepts. In the tests of thinking and concept formation, 22 wooden blocks, varying in shape, height, and color, were used as

the experimental materials. In order to present two sets of stimuli to the subject with one set serving as objects of the subject's activity and the other as signs organizing the activity, the set of wooden blocks included 6 different shapes, 2 heights, and 5 different colors, and one of four nonsense words was written according to the characteristics of the blocks on the underside of each figure so that each nonsense word was not seen by the subject. In a series of interactions with the subject, the examiner encouraged the subject to pick blocks from the prepared set of wooden blocks. More than three hundred subjects, including children, adolescents, and adults, participated in the series of investigations of the concept-formation process completed by Vygotsky and his collaborators.

With regard to his experimental study of concept formation, Vygotsky (1986) stated that "our experimental study proved that it is a functional use of word, or any other sign, as means of focusing one's attention, selecting distinct features and analyzing and synthesizing them, that plays a central role in concept formation" (p. 106). Furthermore, as he argued, "real concepts are impossible without words, and thinking in concepts does not exist beyond verbal thinking" and "that is why the central moment in concept formation, and its generative cause, is a specific use of words as functional 'tools'" (p. 107). As to the use of words and other signs in problem solving, Vygotsky asserted that "words and other signs are those means that direct our mental operations, control their course, and channel them toward the solution of the problem confronting us" (pp. 106-107).

In the study of Vygotsky (1986), the process of concept formation was divided into three major phases, with the first two phases characterized by synthetic images and thinking in complexes, constituting one root of concept formation, and the third phase marked by the formation of potential concepts, constituting another root in the process leading to concept formation. Vygotsky mentioned that the syncretic image or group is formed by the child's immediate perception on the basis of the spatial, temporal, or other relational contiguity in the elements contained in a syncretic group, and then a refined syncretic image may be constituted by the child in a more complex base from the syncretic groups which have been already formed. Vygotsky stated that thinking in complexes are developed in the second major phase on the way to concept formation, and the individual objects in a complex are united not merely by the subjective impressions of the child but also by the bonds between the components of a complex. As contended by Vygotsky according to the evidence derived from the experimental observations with regard to the bonds between the components of a complex, since a concrete grouping of objects united by factual bonds may first and foremost constitute a complex and direct experience helps the child discover factual bonds underlying complexes, concrete and factual, rather than logical and abstract, bonds were observed to exist between the components of a complex. In the investigation of Vygotsky, five basic types of complexes were observed to succeed one another during the phase of the child's formation of thinking in complexes formed by blocks of different sizes, shapes, and colors.

In the experiment of Vygotsky (1986), the subject was first given a sample object, which had its name visible and formed the nucleus from which a group was to be built. The child was found not to pick objects at random. As classified by Vygotsky, an associative complex was built when blocks were added by the child to the nuclear object to form a group of blocks each due to the same color, or similar to the nucleus in shape or in size, or in any other attribute such as a contrast or proximity in space, while a collection complex was formed when a group of blocks were chosen on the basis of their functional cooperation to complement the attribute of the sample object and constituted such a group as a collection of blocks each of a different form or color. With individual links dynamically and consecutively joined into a single chain and meaning carried over from one link

to the next, a chain complex was constituted. As Vygotsky indicated, a single trait by which an object was included in a chain complex did not play a special role as in a concept, since the single trait was not abstracted from the rest by the child, and the chain complex would be the purest form of thinking in complexes. Furthermore, since perceptually concrete groups of images or objects were constituted by diffuse, indeterminate bonds to form a diffuse complex, the diffuse complex was characterized by “the fluidity of the very attribute that unites its single elements” (p. 117). Vygotsky asserted that the real-life parallel of the diffuse complexes observed in the experiments would be the child’s generalizations in the nonperceptual and nonpractical areas of his thinking, not easily verified through perceptual or practical action, and possessing bonds based on dim, unreal, unstable attributes.

### 3. PSEUDOCONCEPTS AND CONCEPTS

As asserted by Vygotsky (1986) with regard to the difference between a complex and a concept, “since a complex is not formed on the plane of abstract logical thinking, the bonds that create it, as well as the bonds it helps to create, lack logical unity; they may be of many different kinds. Any factually present connection may lead to the inclusion of a given element into a complex. That is the main difference between a complex and a concept” (p. 113). Vygotsky contended that the bonds of a complex may relate the elements to one another and to the whole as diversely as the relations and contacts of the elements may be in reality, but objects contained in a concept may be grouped according to one attribute. With the principle function of establishing bonds and relations, complex thinking groups discrete elements of experience into groups, begins the unification of scattered impressions, and creates a basis for later generalizations.

As mentioned by Goethe, “synthesis and analysis presuppose each other as inhalation presuppose exhalation” (Vygotsky, 1986, p. 136). Vygotsky argued that the formation of an advanced concept presupposes more than unification, and it would be crucial in concept formation not merely to unite, but also “to abstract, to single out elements, and to view the abstracted elements apart from the totality of the concrete experience in which they are embedded” (p. 135). As mentioned by Vygotsky with regard to the formations constituted in the development of abstraction, through grouping on the basis of a single attribute such as only flat objects or only round ones rather than grouping of objects on the basis of maximum similarity, the products produced by the child may be viewed as pseudoconcepts, which are distinguishable from the product of a concept.

In the form of a pseudoconcept, the complex thinking of bridge, as Vygotsky (1986) mentioned, is one type of complex between complexes and the final, highest developmental stage in concept formation, and was observed to be produced by the child in the setting of the experiment of Vygotsky when a sample was surrounded with objects in a similar way as a group of objects may be formed on the basis of an abstract concept. Furthermore, he argued that in the preschool child’s thinking pseudoconcepts have more influence over all other complexes since the child’s development of a complex tends to be predetermined by the meaning of a given word, which has already existed in the language of adults, and it would not take place frequently for the child to spontaneously develop complexes corresponding to word meanings in real life. While Vygotsky indicated that it would be inappropriate to assume that the child’s thinking has included all the forms of adult intellectual activity due to the functional equivalence of complex and concept, the coincidence of many word meanings for the child and the adult, the presence of their mutual understanding, and the similarity of their thought processes, thinking

in complexes and thinking in concepts would be connected by the pseudoconcept so that the child may practice conceptual thinking and operate with concepts even before he completely understand the nature of conceptual operations.

#### 4. SPEECH AND DRAWING

With regard to children's use of language and other forms of representation during the development of concepts, Vygotsky (1978) asserted that children solve practical tasks not merely with the aid of their eyes and hands, but also with the help of their speech, and child drawing, as graphic speech, develops on the basis of verbal speech, and would become an independent sign and acquire meaning, while initially supported by gesture. Whereas Vygotsky believed that it would be a powerful factor in the development of concepts for children to engage in verbal communication with adults, he argued that children's capacity to use language as a tool in problem solving would change to the greatest extent when socialized speech is internalized and children's socialization of practical intellect would take place in the process of the internalization of social speech, through which children's use of language takes on not only an interpersonal function, but an intrapersonal function as well. Furthermore, he asserted that children's speech would possess the planning function in guiding and determining the course of action when speech comes to the starting point of an activity.

Researchers have attempted to study Vygotsky's theory of children's speech and thought by investigating children's use of language and formation of thinking in various contexts (e.g., Al-Namlah, Meins, & Fernyhough, 2012; Fraugenglass & Diaz, 1985; Iao et al., 2015). The study of Iao et al. (2015) investigated preschoolers' use of language during social cognitive processing within a context where they needed to understand and use the psychological properties of others, including person-specific characteristics, perception, intention, and belief. The finding of their study suggested that children may use language in the form of private language to regulate the thinking process of social cognition. As indicated by Fraugenglass and Diaz (1985), while some empirical findings suggested that children's private speech does not occur frequently and little functional relationship would exist between children's production of private speech and success in cognitive tasks, the results of their study showed that children's production of private speech is indeed minimized by the condition most frequently used in the studies challenging Vygotsky's theory regarding the self-regulatory functions of children's private speech. It was found in their study that children's greater production of self-regulatory speech was associated with their failure in tasks, and the number of mutterings and whispers would increase with the decline in the number of self-regulatory utterances. This result is consistent with Vygotsky's assertion that children's private speech does not disappear with age but turns inward to constitute inner speech. Al-Namlah, Meins, and Fernyhough (2012) investigated the relation between children's use of self-regulatory private speech and recall and organization of autobiographical memories. While children's use of private speech that served no regulatory function was found in their study to be unrelated to all memory variables, children's use of self-regulatory private speech during the planning task was found to be related to longer autobiographical narratives containing specific rather than general memories and recalled with greater narrative cohesion and more evaluative information.

As contended by Vygotsky (1978) with regard to child speech and drawing, child drawing, as graphic speech, develops on the basis of verbal speech, and would become an independent sign and acquire meaning,

while initially supported by gesture. Furthermore, he argued that children would engage in the second-order symbolism as they create written signs for the spoken symbols of words and children's drawing activities should be arranged to encourage children to draw not only things but speech as well. The study of Huntsinger et al. (2011) indicated that children would produce more advanced graphical representations if they are provided with more opportunities to draw and more guidance in drawing. As they mentioned, since the Vygotskian perspective suggested that it would be beneficial to young children to do drawing under adult guidance, more intentional teaching may be provided to young children to promote the development of their representational skills involved in the creative arts.

To understand children's concept formation and writing emergence, Wu (2009) investigated children's formation of various types of thinking and production of graphical representations and conventionally written symbols. As revealed by the findings of the study, drawing would be a significant contributor to young children's formation of thinking and concept, and young children would tend to use object correspondence or chains of object correspondence within contextual correspondence to produce whole contextual representations in their drawings, which may contain graphical representations and conventionally written symbols, individually or collectively representing their thinking or concepts formed during drawing. From the perspective of graphical multi-signification, Wu (2013) examined qualitatively how children's drawing would contribute to children's concept formation and writing emergence. As found in the study, children's capability for graphical multi-signification would develop in such a consistent transition way that children would tend to first produce pictographic symbols and then consistently transit to the use of ideographic symbols for multi-signification, and children's formation of concepts and complex thinking during the development of graphical multi-signification would tend to be characterized by children's contingency association, focus variation, and extension chain. To enhance children's concept formation and writing in drawing activities, early childhood educators may help a child to transform her/his drawing into a two-part conceptual structure. Within a two-part conceptual structure, the first part may be structured to depict the operations of within-group and between-group extension chain taken by the child during drawing, while the second part may be extended to present the conceptual sequential extensions, which would be embedded in the child's drawing with respect to literal, contextual, and extensive signification.

## **5. CONCLUDING REMARKS**

Children's formation of thinking and concepts is associated with their creativity and capacity for problem solving. While the 1999 report of the National Advisory Committee on Creative and Cultural Education described the essence of teaching for creativity as provision of instruction to young people in the forms which would encourage them to develop their own thinking or behavior (as cited in Jeffrey and Craft, 2004), in child development, the zone of proximal development, as Vygotsky (1978) proposed, defines those not-yet-matured functions which are in the process of maturation and indicates the distance between the actual developmental level and the potential development level as determined by the two respective problem solving settings of independent problem solving and problem solving under adult guidance or in collaboration with more capable peers. Educators of young children may provide young children with developmentally appropriate activities such as play and drawing, which may be arranged in such a way that children's formation of thinking and concepts

may be enhanced through the use of languages and other symbol systems not merely on their own, but under adult guidance or in collaboration with more capable peers as well.

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