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Children's development of conceptual knowledge structures

Tse Lai Man, Jane

A dissertation submitted in partial fulfillment of the requirements for the Bachelor of Science (Speech and Hearing Sciences), The University of Hong Kong, April 30, 1997.
Abstract

This study investigates the development of children's knowledge structure. Knowledge structure is presented as having four structures (i) thematic/schematic knowledge structure (ii) slot-filler category knowledge structure (iii) conventional category knowledge structure and (iv) vertical taxonomic knowledge structure. (Nelson, K. 1992) Fifty preschoolers and 50 adults undertook in a cued recall task. Forty-two children in three equal groups with mean ages of 3;6,6;6,9;6 undertook a word association task. Results show that there is no shift from thematic to taxonomic knowledge organization from preschool to adult age. Preschoolers have both the thematic and taxonomic knowledge structure, with each kind of knowledge structure changing developmentally.
INTRODUCTION:

The development of children's knowledge structure has become an area of growing interest in language acquisition. Knowledge structures are assumed to guide word acquisition, by anchoring word meanings within the structure. Research have been done to determine when children have taxonomic conceptual organization and others, and to describe the general knowledge structure development from early childhood to adulthood. This paper investigates the general development of conceptual knowledge organization from age 3;6 to adult years. It also discusses the use of knowledge structure in children and its development.

Before reviewing the previous studies, the nature of knowledge organization are introduced first.

Knowledge structure:

Knowledge organization have at least two distinct forms: One is complementary relationships, these preserve the temporal-spatial and functional relationship in memory. e.g. head and hat. The other is taxonomic relationships, these rest similarity among units being represented. e.g. dog and cat. Katherine Nelson further distinguished forms of taxonomic knowledge: (i) slot filler category, in which items cohere as a category on the basis of shared function within an event, (ii) the conventional category in which groupings are based on general shared function without the constraint by event-based understanding and (iii) vertical relationship which representing links between items at different hierarchical levels.
Few methods have been used in the previous research to investigate the development of knowledge structure in children. As they are important to the interpretation of the research findings, the nature of each methodology is introduced here.

**Methodologies:**

**Free association** - This method involves presenting a stimulus word to the subject, and asking him/her to respond by giving the first word that comes to his/her mind, other than the stimulus word. It is to investigate the developmental change of lexical memory organization by reviewing the changes in the form of knowledge structure associated in the word task.

**Cued recall** - Subjects in the task are required to associate the to-be-remembered word with a specific cue word. The previously existing strength of the association in memory should be the most important influence on subjects’ abilities to recall the TBR word. Thus, the data is assumed to provide information on the relative accessibility of different types of organization in lexical memory.

**Previous Research:**

Previous research results divide into two major camps. One camp suggests a shift of knowledge structure organization from complementary to taxonomic, including lexical memory. They argue that early knowledge including knowledge of words, is organized in a schematic (episodic) fashion, and taxonomic (semantic) structure is added gradually to that schematic organization. For example, Nelson (1974) has claimed that children’s early word concepts are based on perceptual-motor experiences, with functional characteristics being the core of the developing concept. Related by Mandler (1983), who argues that young children’s
knowledge is organized schematically rather than categorically. Schematic organization typifies the relationships found in real-world scenes, stories, and events. Scripts and schemes, then, rely on functional relationships among items to provide a basis for conceptual structures in semantic memory.

Evidence for this view comes from many experimental sources. For example, Smiley and Brown's study in 1979 show that, when a forced choice triad tasks where a category match (e.g., easy chair and kitchen chair) and a thematic match (e.g., chair and person) are both available, preschoolers typically select the two thematically related objects, while school-age children are more apt to select the two categorical related objects. Other studies using a variety of tasks such as word association tasks (Nelson, 1977), sorting tasks (Denney, 1974), and semantic priming tasks (McCauley, Weil, & Brown, 1979) also suggest increasing knowledge and use of taxonomic relations with age.

All these experimental results support a shift from schematic to taxonomic knowledge structure organization. The shift includes lexical memory and it indicates that conceptual information is not taxonomically organized in children until age seven (Heidenheimer, 1979).

Inhelder and Piaget (1964) claim the necessary understanding of part-whole class relations remains to be achieved for they say it is part of the stage of concrete operations at age seven or later. Before this stage, children's knowledge structure in particular on thematic or complementary relations, or on collective groupings. This is because they lack the requisite cognitive structure for coordinating the intention of a class with its extension.

Nelson (1977; 1979; 1982; Lucariello and Nelson, 1985) suggested a detail theory
of shift organization from schematic to taxonomic knowledge. She claimed that event-based and taxonomic knowledge structures emerge developmentally, with children initially using event-based knowledge structures. The transition is aided by slot-filler categories as a mediating structure. Slot-filler categories are groupings that emerge after repeated exposure to a particular routine script, and are bounded by the script. At the slot-filler level, categories exist only within the framework of the script that binds them. Eventually these groupings are extracted from the scripts and put into taxonomic categories. For example, children initially have event-based knowledge of the dinner routine. After repeated experience of dinner time, children form a slot-filler groupings of food items within the “things I eat for dinner” script. Afterwards, this grouping is extracted from the script and put into the “food” taxonomy.

The conclusion that preschoolers cannot understand taxonomic category relations has been challenged recently and indeed replaced by a large extent by the view that young children do employ such relation. The current stance, a “nonshift” view, holds that both taxonomic and schematic knowledge are available to the young child.

Empirical support comes from many experimental sources. The match to sample task (Fenson, Cameron, and Kennedy, 1988) suggested that most children as young as two are able to match objects with categorically related pictures (both basic and superordinate matches). Others like forced-choice or sorting tasks (Markman and Hutchison, 1984) also demonstrated preschoolers’ ability to form taxonomic groupings.
AIM OF THE STUDY:

In this research, two experiments with different methodologies: cued recall task and word association task were done to:

(i) appreciate better the influence of different methodologies to this field's study and

(ii) get a full picture of the children's development of knowledge organization.

It is expected that if we use the word association as a method to explore the development of knowledge structure organization in children. Word association task's result should show the same pattern as that of the cued recall task. The increase of taxonomic category response in the word task should imply the increase of relative effectiveness of taxonomic cues in the recall task.

Besides, if there is shift of conceptual knowledge structure from schematic to taxonomic organization, and it follows Nelson's developmental theory, schematic relationship should review the strongest relative associative strength in the cue recall task for the preschoolers. The relative effectiveness of taxonomic cues should increase with age, because taxonomic knowledge structure are established later than schematic one.

Apart from investigating the above research questions, this study especially the word task also aim at giving us information on the use of different knowledge structure in children.
WORD ASSOCIATION TASK

Method:

Subjects. The subjects were 42 Cantonese-speaking children who study in 1 kindergarten or 3 primary schools in Hong Kong. They were divided into 3 groups. Each group consisted of 7 boys and 7 girls.

3-year-olds: mean age 3;6,
6-year-olds: mean age 6;6
9-year-olds: mean age 9;6

They were reported to have normal hearing and language abilities.

Materials. Three stimulus words from each of five categories formed the list for the word-association task giving a total of 15 stimulus words. The categories were food, table service, clothes, animal, vehicles. The words were counterbalanced by randomly selecting one from each category to be the first of the six words, and repeating the process for the second and the third six-word groups in the list.

Table 1: Stimulus word for word-association task

<table>
<thead>
<tr>
<th>bus</th>
<th>ship</th>
</tr>
</thead>
<tbody>
<tr>
<td>bird</td>
<td>tiger</td>
</tr>
<tr>
<td>apple</td>
<td>biscuit</td>
</tr>
<tr>
<td>chopsticks</td>
<td>bowl</td>
</tr>
<tr>
<td>socks</td>
<td>T-shirt</td>
</tr>
<tr>
<td>plane</td>
<td>dish</td>
</tr>
<tr>
<td>dog</td>
<td>trousers</td>
</tr>
<tr>
<td>orange</td>
<td></td>
</tr>
</tbody>
</table>
Procedures. Children took part individually in a quiet room in their preschool or school. The experimenter demonstrated the task with the following instructions:

I am going to play a word game with you. When I say some words, I want you to tell me the thing you think of. I’ll show you what I mean. I say the word “rat” and the first thing I think of is “animal”. It is because a rat is an animal. I say the word “rabbit” and the first thing I think of is “jump”. It is because rabbit can jump. Here are some for you to try. What’s the first thing you think of when I say the word ......?

Two practice words were given first to ensure that the child knew how to respond. The interviews were audiotaped for later accuracy checks.

Coding and reliability. The experimenter wrote down all the children’s responses. Responses were coded into three major categories: thematic, slot-filler and conventional category. A second coder, who was trained before on the coding criteria, including the definitions of each category, coded the responses independently. It yielded a 92.9%, 96.4% and 92.9% agreement on 3, 6 and 9 years old children’s responses, respectively.
Results:

The distribution of response categories by age appear in Table 2. The children’s different choices for complementary, slot-filler and coordinate relationship were analyzed, using chi-square. The complementary pairs were chosen significantly greater than chance by the 3;6 and 6;6 age groups.

Table 2: Distribution of responses categories in word association task

<table>
<thead>
<tr>
<th>Age</th>
<th>Responses Categories</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>event</td>
<td>slot</td>
</tr>
<tr>
<td>3;6</td>
<td>197</td>
<td>5</td>
</tr>
<tr>
<td>6;6</td>
<td>154</td>
<td>25</td>
</tr>
<tr>
<td>9;6</td>
<td>104</td>
<td>46</td>
</tr>
<tr>
<td>Totals</td>
<td>455</td>
<td>76</td>
</tr>
</tbody>
</table>

Note: Event type of response and all the other three categories differ significantly in 3;6, \( \chi^2 = 12.63, p > .001 \); and 6;6, \( \chi^2 = 3.9, p > .05 \)

A one way ANOVA was performed with the subject’s response categories as the dependent variable. Three categories of responses were compared: (a) event-type relation (b) slot-filler type category and (c) conventional type category.

The difference among the three categories is significant for all ages combined, \( F(2, 195) = 38.21, p > .001 \). The response categories that subject associate the most can be arranged as

event-type > slot-filler type > conventional type. (figure 1)
Figure 1: The distribution of response categories by age
Consistent with the previous research findings, preschoolers associate words mainly on the basis of complementary way, the taxonomic association emerge with age. These data may have previously interpreted as indicating developmental change from schematically organized to taxonomically organized lexical memory. To appreciate better the influence of different methodology to this field's study. The second experiment was done to justify the interpretation of the word association's results on children's knowledge structure development.

**CUED RECALL TASK:**

**Method:**

Subjects. The subjects were Fifty preschool children who study in 1 kindergarten and 50 college-age adults subjects. Ten subjects in each age group were randomly assigned to each of the five cued recall conditions.

- Children group : age range from 3;6 to 4;11, mean age 3;8
- Adult group : age range from 23-25, mean age 23;8

Materials. There were five relations between cues and the to-be-remembered item (TBR). In one condition, the cue and the TBR words were related schematically. In one, cue and TBR words were both members of the same slot-filler category. In one, cue and TBR words were conventional. In one, the cue and TBR words were related vertically, and in a control condition, cues were not related to TBR items, either schematically or taxonomically.
Cues and TBR items for the children group were selected from a pool of items generated during pilot research with 15 preschool children. Five children were assigned to each of the three interword conditions, hierarchical, script and functional/contextual. In the hierarchical interviews, subjects were asked to provide exemplars of seven superordinate categories: animals, furniture, toys, vehicles, food, drinks and utensils. In the script interviews, subjects were asked to provide examples of two subcategories within each of the superordinate categories listed above. The subcategories were zoo animals and pets; girls' toys and boys' toys; land vehicles and air vehicles; living room furniture and bedroom furniture; breakfast drinks and daily drinks; breakfast food and daily food; eating utensils and cooking utensils. In the functional/contextual interviews, subjects were asked to talk about each of the items with respect to what we do with them, where we find them and what things we find with them. To construct the seven TBR items, one subcategory from each superordinate category was randomly selected and the most frequently given response in that subcategory became a TBR item. Cue items for the four cue conditions were then determined. For the superordinate cue condition, the superordinate labels used in the superordinate interviews served as cues. For the slot-filler cue condition, for each TBR items another item in the same category was used as a cue, each cue being the second most frequently generated item in its subcategories during the script interviews. For the coordinate cue condition, the most frequently generated items in the subcategories knot providing TBR items were selected. Finally, for the schematic cue condition, the most frequently produced nouns from the functional/contextual interviews were used as cues.
Cues and TBR items for the adult group were selected in a similar procedures to those of the children group.

Table 3: Cues and to-be-remembered items for adult subjects

<table>
<thead>
<tr>
<th>TBR</th>
<th>Schematic</th>
<th>Taxonomic</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Superordinate</td>
<td>Slot-filler</td>
<td>Control</td>
</tr>
<tr>
<td>school</td>
<td>church</td>
<td>building</td>
<td>student</td>
</tr>
<tr>
<td>monkey</td>
<td>elephant</td>
<td>animal</td>
<td>zoo</td>
</tr>
<tr>
<td>bus</td>
<td>van</td>
<td>transport</td>
<td>road</td>
</tr>
<tr>
<td>nurse</td>
<td>secretary</td>
<td>occupation</td>
<td>hospital</td>
</tr>
<tr>
<td>Buddhism</td>
<td>Taoism</td>
<td>religion</td>
<td>monk</td>
</tr>
<tr>
<td>doll</td>
<td>cook set</td>
<td>toy</td>
<td>children</td>
</tr>
<tr>
<td>squash</td>
<td>badminton</td>
<td>sports</td>
<td>sports</td>
</tr>
<tr>
<td>USA</td>
<td>England</td>
<td>country</td>
<td>green card</td>
</tr>
<tr>
<td>bed</td>
<td>bookshelf</td>
<td>furniture</td>
<td>bedroom</td>
</tr>
<tr>
<td>chopsticks</td>
<td>bowl</td>
<td>utensils</td>
<td>tables</td>
</tr>
<tr>
<td>television</td>
<td>hi-fi</td>
<td>electrical</td>
<td>programs</td>
</tr>
<tr>
<td>pink</td>
<td>purple</td>
<td>color</td>
<td>feminine</td>
</tr>
<tr>
<td>narcissus</td>
<td>peach</td>
<td>flower</td>
<td>lunar new</td>
</tr>
<tr>
<td>congee</td>
<td>noodles</td>
<td>food</td>
<td>bowl</td>
</tr>
<tr>
<td>saxophone</td>
<td>piccolo</td>
<td>musical</td>
<td>concert</td>
</tr>
<tr>
<td>wax gourd</td>
<td>cucumber</td>
<td>vegetables</td>
<td>soup</td>
</tr>
<tr>
<td>owl</td>
<td>eagle</td>
<td>birds</td>
<td>night</td>
</tr>
<tr>
<td>water melon</td>
<td>peach</td>
<td>fruit</td>
<td>summer</td>
</tr>
<tr>
<td>scarf</td>
<td>gloves</td>
<td>clothes</td>
<td>winter</td>
</tr>
<tr>
<td>milk</td>
<td>orange</td>
<td>drinks</td>
<td>cup</td>
</tr>
</tbody>
</table>

Note: words were presented in Cantonese during the experiment.
Table 4: Cues and to-be-remembered items for child subjects

<table>
<thead>
<tr>
<th>TBR</th>
<th>Schematic</th>
<th>Taxonomic</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Superordinate</td>
<td>Slot-filler</td>
<td>Conventional</td>
</tr>
<tr>
<td>monkey</td>
<td>elephant</td>
<td>animal</td>
<td>zoo</td>
</tr>
<tr>
<td>milk</td>
<td>orange juice</td>
<td>drinks</td>
<td>cow</td>
</tr>
<tr>
<td>spoon</td>
<td>bowl</td>
<td>utensils</td>
<td>table</td>
</tr>
<tr>
<td>bus</td>
<td>taxi</td>
<td>transport</td>
<td>road</td>
</tr>
<tr>
<td>doll</td>
<td>cook set</td>
<td>toy</td>
<td>children</td>
</tr>
<tr>
<td>table</td>
<td>sofa</td>
<td>furniture</td>
<td>home</td>
</tr>
<tr>
<td>fish</td>
<td>vegetables</td>
<td>food</td>
<td>dish</td>
</tr>
</tbody>
</table>

Note: words were presented in Cantonese during the experiment

Procedures. Subjects took part individually in a quiet room and the task was presented to the children as a two part word game played by two hand puppets named Siu Ming and Siu Fa. During the first part of the game, Siu Ming puppets presented the cues and the Siu Fa answered with the TBR items. In the testing part, Siu Ming presented the cue, the child took Siu Fa and answered for him, trying to remember exactly what Siu Fa said in response to that word in the first part of the game. The researcher presented two practice items first, let the child to play Siu Fa in the testing mode, then the items for data were presented randomly.
Results:

The mean proportion of TBR items correctly recalled by each age and cue condition are summarized in Table 5. These data were analyzed in 2 (age) × 4 (cue condition) analysis of variance (ANOVA). The ANOVA showed significant main effects for age, $F(1,18) = 43.94, P > .001$, and for cue condition, $F(3,54) = 26.29, p > .001$, but no interaction between age and cue condition, $F(3,54) = 1.09, p > .05$. Post hoc Scheffe tests between cue conditions indicated that the number of items recalled in the Coordinate condition was significantly less than that in the schematic and superordinate conditions, $p > .001$. These two did not differ significantly from number of items recalled in the slot-filler condition.

Table 5: Proportion of to-be remembered items recalled correctly by subjects

<table>
<thead>
<tr>
<th>Group</th>
<th>Schematic</th>
<th>Taxonomic</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Superordinate</td>
<td>Slot-filler</td>
<td>Conventional</td>
</tr>
<tr>
<td>Preschool</td>
<td>.59</td>
<td>.56</td>
<td>.43</td>
</tr>
<tr>
<td>Adult</td>
<td>.71</td>
<td>.78</td>
<td>.58</td>
</tr>
</tbody>
</table>
Figure 2: Proportion of to-be-remembered items recalled correctly by subjects.
The results of the experiment provide no evidence of a developmental change in the relative strength of different types of interword relationships.

Children’s recall can benefit from both the taxonomic and schematic cues just like of adult at least with those materials that were familiar to them such as ones used in this experiment.

The results of cued recall task does not match the interpretation of word association task. This result and possible explanations on the use of different methodologies will be discussed in the next session.

The relative strength of different types of taxonomic relationship can be further explained through the comparisons of mean number of items recalled between different cue condition. Schematic and superordinate cues were most effective in aiding recall, and conventional cues were least effective, for both preschool group and adult group. This pattern and possible explanations will be further considered in the next session.

**GENERAL DISCUSSION:**

*The method for finding out the children’s knowledge structure:*

Comparison of two methodologies indicate that the preferences for relationship pairings were independent of the children’s ability to benefit from recall. Although children’s taxonomic association in the word task increase with age, there is no equivalent increasing effectiveness of taxonomic cues with respect in the recall task.
Thus using the word-association data would be better attributed to a shift in preference for certain kinds of responding rather than to a shift in the structure of lexical memory. (Smiley and Brown, 1979). As proposed by Blewitt and Toppino, a shift in preference may be associated with children's increasing knowledge of the nature of hierarchies and of the particular usefulness of hierarchical relation for drawing inferences.

The use of the cued recall task has some important advantages over others employed in some previous studies of the development of semantic memory. In a cued recall task, neither the encoding nor the retrieval of the TBR word is as free to vary with preference or with contextual influences as it is in free recall or word association task. As subjects are required to associate the TBR word with a specific cue word, the previously existing strength of the association in memory should be the most important influence on subjects' abilities to recall the TBR word given the cue.

**Development of children's general knowledge organization:**

We examined this issue by using the cued recall tasks. The results of the cued recall task provide evidence against Nelson's theory. Nelson's theory of taxonomic development describes processes by which children might construct a taxonomically organized lexicon from a schematically organized knowledge base. However, do children's lexical memories undergo a shift from schematic to taxonomic organization? Results of the cued-recall task provide no evidence of developmental change in the relative strength of different types of interword relationships. Thus the data do not support the hypothesis that the structure of lexical memory is altered substantially between early childhood and adulthood.
As mentioned in the introduction part of this study, some researches also call into question the very existence of such a shift. For example, schematic organization does not necessarily diminish in importance with age. (Smiley & Brown, 1979) And, taxonomic organization seems to be part of even the young child's knowledge structures. (Callanan, 1989) Although Nelson (1993) acknowledges that young children sometimes reveal knowledge of taxonomic relations, she argues that these are essentially slot-filler relations, abstracted from the substitutability of labels in scripts, the results of the cued recall task reported here fail to support Nelson's view that slot-filler relations are constructed before conventional.

Krackow and Blewitt (1989) also report evidence against Nelson's view of how conventional relationship are constructed. The results of the experiment therefore provide no evidence of developmental change in the organization of conceptual knowledge structure and that both spatial-temporal contiguity and similarity readily serve as a basis for forming interword associations, from early childhood onward.

The relative strength of different types of taxonomic relationship

Nelson's theory suggested that taxonomic relationship in lexical memory are abstracted from a schematically organized knowledge with the aid of slot-filler categories. In support of Nelson's theory, it is found that the slot-filler relationship and schematic relationship were stronger than the conventional relationships in the lexical memory. However, Nelson's position predicts that coordinate relationships should increase in strength with age relative to other relationship. We found no evidence for that prediction in this research. Thus, the data of this study indicate that both the schematic relationship and slot-filler relationship are stronger than
coordinate relationship in lexical memory, but we found lack evidence that there is a shift of organization from a schematically organized knowledge through the aid of slot-filler categories.

Slot-filler category do relate stronger in lexical memory than the conventional one, it is possible that, consistent with Nelson's view, the principle of substitutability within scripts is important in determining what terms will be related in lexical memory. However, it does not support Nelson's view that taxonomic knowledge structure is developed through the aid of slot-filler categories as adult also find the slot-filler category relate stronger in lexical memory.

The development of schematic and taxonomic organization:

Children's schematic and taxonomic knowledge may change in a variety of ways with age. For example, both Schank and Ableson (1977), provide some evidence for growth in complexity and completeness of schematic knowledge with increasing age. Children's understanding of hierarchical, taxonomic structure of inclusion relations and their implications also appears to improve with age.

The knowledge structure available to children:

Both complementary and taxonomic knowledge structure are available to children. As the stimulus we used in the experiment is a thoroughly most typical and familiar one to children, the taxonomic knowledge structure may be limited to typical members in the category.

As Bjorklund (1985) suggests, even young children will show evidence of knowledge of taxonomies in free recall if they are tested on highly familiar materials.
where items are typical members of superordinate categories.

Other research also suggests the development of each type of taxonomic organization from preschool to adult years. For example, the developmental implications of Rosch's work suggests that superordinate categories are gradually built up around the core or prototypical exemplars, and only with development do children's hierarchical structures expand to include nontypical instances.

The experimental study of Fenson, Vella and Kennedy (1989) shows similar results. Early in development, the shared features that define a category for the child are likely to be perceptual (e.g. dogs and cats look alike in many aspects) and/or functional (dogs and cats are both treated as pets). With increasing maturity, children become progressively more able to appreciate the abstract features which define higher level taxonomic relation. (e.g. birds and buffalo are both animals)

**The use of schematic and taxonomic organization:**

As indicated by the word association and recall tasks, the most salient type of relation is complementary for either children or adult. Also, in most of the previous studies, there is less clearly established decreasing dependence on schematically organized information. There is little question that children find thematic relations very compelling and in some circumstances, more compelling than taxonomic relations. According to (Mandler et al. 1980) it is not surprising as eventlike meaningful structure are a universally important and normal way of organizing information even for adult. We continually rely on our knowledge of such thematic relation between objects in order to interpret ongoing events, to comprehend what is happening, to make simple decision, to solve problems and to predict the
consequences of actions. In other words, thematic relations encompass an enormous amount of knowledge.

CONCLUSIONS:

The results of the experiment provide no evidence of developmental change in the relative strength of different types of interword relationships. Thus the data do not support the hypothesis that the structure of lexical memory is altered substantially between early childhood and adulthood.

Children's recall can benefit from both the taxonomic and schematic cues same as that in adult, such result indicate that children also have the taxonomic knowledge structure at least in those materials that were familiar with them like the one used in this experiment.

With age increase, each kind of knowledge may change developmentally. As suggested by Mandler in 1983, we would expect increasing elaboration and differentiation of both kinds of knowledge.

CLINICAL IMPLICATIONS:

The results of this research show that the schematic knowledge structure is very salient and important for either children or adult to organize information. As it is important of using schematic knowledge structure in order to interpret ongoing events and to comprehend what is happening (mandler et al., 1980), training on event knowledge of children with comprehension will be very useful.
FURTHER RESEARCH:

This study provides a preliminary view on the normal children's general knowledge structure development. As there are some literature about the semantic memory weaknesses experienced by the children with learning disabilities, (Baker, Ceci, & Herrmann, 1977) it is beneficial to replicate this study to the disordered group.

Besides, there are literature suggesting that comprehension and inferences all require an inherent knowledge of relationships (Baker, Ceci, & Herrmann, 1987), it is beneficial to investigate the relationship between comprehension and both the taxonomic and schematic knowledge structure in preschoolers.

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Appendix:

Definitions and examples of the word association task coding categories:

1. Slot-filler category response—response denoting an object that shares the same function as the test word object within an event or spatio-temporal context. The object must be in the same superordinate category as the test word object and at the same hierarchical level within the taxonomic hierarchy (e.g. tiger-zebra; boots-hat).

2. Conventional category response—Response denoting an object that shares the same function as the test word object but is from a different event or spatio-temporal context. The object must be in the same superordinate category as the test word object and at the same hierarchical level within the taxonomic hierarchy (e.g. dog-tiger).

3. Thematic/Schematic response—response denoting a characteristic function of the test word object, (e.g. apple-cat) or denoting an object that occurs in the same event schema, (e.g. cake-plate) or denoting a place, time, or event in which the test word object typically occurs. (e.g. tiger-zoo)

4. Others—denial replies, response denoting a characteristic perceptual attribute.