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Flying, Feathery and Beaked Objects: Children's Mental Models About Birds

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Abstract

Purpose of this research is to state preschool students' mental model about birds by analyzing their drawing. This is a hermeneutical phenomenology research that is based on social constructivist philosophy. Typical case sampling method has used in order to form working group of this research. Working group consisting of 325 children who are in preschool education programs in Kastamonu Central District. Data gathered by draw and explain technique in this research. Firstly, children had asked to draw bird picture, then semi-constructed interview has made with children. By analyzing data gathered for this research, it is seen that significant amount of children drawn bird with outline drawing style (*f*=167, *%*=51.3). 181 children (*f*=181, *%*=55.6) drawn basic features of birds, and 83 children (*%*=25.5) drawn them as behavior shown. Majority of the children said that they see birds on outdoor environments (*f*=279, *%*=85.8), and also significant amount of children stated that the fundamental property of bird is their ability to fly (*f*=127, *%*=39.0). After analyzing these findings, it it seen that children have non-biological based, only physical property based modal and physical mental models about birds and their natural properties. Also, it was determined that children have developed their basic knowledge of birds in outdoor environments. In light of these results, necessity of including animal and habitat education with direct-learning methods in preschool curriculum and its necessity to apply this education in outdoor mediums with direct animal observations and experiences with them are underlined.

Keywords: Birds, draw and explain, mental model, child.

Introduction

Animals and humans are two species who have been in interaction from the beginning of the history. While time pass, humans have built this relationship in favor of their interest, and established dominance on animals. Serpell (2004) explains human's interest and their efforts on taming animals with three aspects: (a) their effects on humans, (b) their sympathetic appearance in human point of view and (c) their economical utility. In another opinion (Herzog & Burghardt, 1988), human's attitude on animals are affected by direct and indirect factors. According to Herzon and Burghardt (1988), direct effects are fear of animals which helped evolutional development of humanity, husbandry and distribution of animal population, while indirect effects are completely anthropomorphic generalizations and our perspective on their basic properties of animals, (for example: eyes, color, movements etc.) as we see them as "cute" things. Generally, humans are highly interested in animals if they find humanly properties on animals and also if they involve in frequent interactions.

In our daily life, it is obvious that we are not living with wide animal species (if we are not living in rural area or we are not working in animal related industries). Generally speaking, individuals are not involved any kind of interaction with animals in daily life, except cats, dogs, birds and some insect species. Many of us have only seen wild or

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endemic animal species on TV shows, magazines or Internet (Prokop, Prokop, Tunnicliffe & Diran, 2007). Children, like adults, learn different animal species from the sources said above, additionally, they have interaction with animal shaped soft toys (Tunnicliffe, Gatt, Agius & Pizzuto, 2008). But Prokop et al. (2007) underlines that secondary sources of information like that cause misknowledge on biological concepts and mislearning on them. Animals like bird, cat, dog and fish surrounds our daily life, they even live in our home as pet. This causes that both children and adults have positive opinions on that animals. Nevertheless, experiences and the way we got them with that animals are also developing our attitude toward that animals. Serpell (2004) took birds as an example, and stated that because we can feed them by our hands with our food in same environment, we have more knowledge about birds than fish, and have more positive attitude towards them.

Unfortunately, it is very hard for both children and adults to observe biological and other environmental objects directly and getting knowledge from first hand resources (Evans, Gebbels, Stockill & Green, 2007). Louv (2010) defines this situation as lack of nature and states that this cause various negative effects on child. We obtain our knowledge on biological and ecological concepts way before we start school (Teixeria, 2000). In childhood, animals that can be seen in daily life and have cultural significance are known more (Tunnicliffe et. al., 2008). This is about child's first hand experiences; and in the learning process of biological concepts, childhood is more important than school education (Patrick & Tunnicliffe, 2011). Knowledge learned by this process defined as "naive biology" (Hatano and Inagaki, 1997). This kind of knowledge contains child's ability to make basic definitions related to biological objects and processes harmonically with biological environment (Inagaki and Hatano, 2006). However, this knowledge generally related to child's own experiences and it is not science based (Çardak, 2009). Vosniadou and Brewer (1994) remark that mental models about non science-based knowledge on scientific concepts are deficient and contains misconceptions.

Nowadays, learning defined as active and continuous process which depends on pre-existing knowledge and experience of individuals, and information is seen as the fundamental element of learning (Driver and Bell, 1986). Understanding and learning a consent or phenomenon means recalling related knowledge from memory and using it when it is necessary (White and Gunstone, 1992). Cognitive structures, that reflects symbol, object and relations from different schemas made from the human consciousness, affected from social-cultural life, projecting partial reality are called as mental models. (Gilbert, 2011). In early childhood, not only the education in school, but also the experiences from daily life are important on developing biological and environmental mental models (Prokop, et al., 2007). Child interprets happenings around her and develops mental models with behaviors (Greca and Moreira, 2000; Tunnicliffe, et al., 2008). However, it is not expected to develop metacognitional mental models by that way (Gilbert, 2005). Detection and structure of mental models have significant role on learning process because monads of the memory contain symbols reflecting knowledge instead of knowledge itself (Bruninng, Schraw and Norby, 2014). Because of this reason, it is important to detect children's mental models of concepts in the education. Children show their mental model constructed by understanding world by building models, bodily gestures and drawings (Hall, 2009).

Drawings are not only important to detect what child thinks in educational term, but also important to understand how she perceives her surroundings and makes sense of it (Brooks, 2009). Additionally, according to Piaget (1956) drawings are windows for tracking cognitive development. Vygotsky (1962) also stated drawings as an important tool for cognitive development and underlined that socio-cultural effects are also important as cognitive skills (Piaget, 1956). Hall (2009) highlights that drawings are

helpful tools for pre-school students for acquiring perception, communication, detection and action skills. Moreover, Chang (2012) underlines that in preschool science education, drawings provides data about child's learning on cognitive concepts and events and its extent, moderating configuration of knowledge, and its ability to provide active and entertaining learning process. According to Fello, Raquette and Jalongo (2006), especially in the childhood term, drawings have an important role on constructing science knowledge for developing mental models and also moderating learning process of scientific topics and shows understanding level on that topic. Cinici (2013) underlines that while the drawings are limited by child's information about scientific knowledge, they are important assessment tools to evaluate scientific knowledge level. Especially in recent years, using drawings in scientific knowledge and phenomenon in early childhood term researches becoming popular (Chang, 2012).

In the last years, biology and a general branch of it, ecology, is becoming important as a research field (Randler, 2009). Hatano and Inagaki (1997) states that biological understanding of children starts in early ages. Therefore, researches have made intended for children's knowledge and misconceptions about living world and animals which is a part of biology field. Especially, after Inagaki's research (1990) defining some of the factors influential on children's animal biology understanding become popular (Tunnicliffe, 2011). There are researches (Çardak, 2009a) to determine children's knowledge on animal's skeleton system (Prokop, et al., 2007; Tunnicliffe & Reiss, 1999), animals they see on daily basis (Tunnicliffe, et al., 2008), children's classification between vertebrate and invertebrate animals (Braund, 1998), their perception on hunting and hunt animals (Prokop & Kubiatko, 2008), defining relation between animal's appearances and fear of the animals (Kubiatko, 2012) and their insights on animals which they see as dangerous. In these researches, one of the most underlined and one of the most animal with lots of findings are birds.

After a literature scan, it it seen that underlying reasons for the reason of birds are the most researched animal species are those: Especially in early childhood, birds are more attractive than other species (Randler, 2009), their ability to involve in daily life and their strong properties separates them from other animals (Serpell, 2004). Prokop, Kubiatko and Fancovicova (2007) identified that primary school students can distinguish birds with their general properties, with the growing age their knowledge of birds are also increasing but their knowledge on bird's biological properties are not increasing. In another research of Prokop, Kubiatko and Fancovicova (2008), Slovakian students', whose age between 10-19, importance of observing and feeding birds in order to develop attitude and knowledge about them are underlined. Çardak (2009b) emphasized that college students have misconceptions about characteristics, behavioral properties of birds, human-bird interaction and biological classification of them. Randler (2009) underlines that in primary schools, education especially by using soft toys are effective for giving children ability identify and name bird species. Tunnicliffe (2011) states that English Children between age of 5-15 have enough knowledge about birds and their behaviors but in biological and physical aspects they have several misconceptions After combining all of these researches, there are opinions on lack of literature about children's knowledge on animals, and birds specifically (Prokop, Kubiatko and Fancovicova, 2008), and necessity to detect cultural differences and biological point of views of different age groups (Patrick & Tunnicliffe, 2011). This research has made in order to provide data on the said area and related literature and also to supply data on cultural aspects and different age groups. Additionally, lack of researches focused on preschool students is an important reason why this research is made. In this content, answers to questions below are seek in this research.

a) How is children's mental model on the bird species they interacted frequently in daily life.

b) In which way children draw and explain the concept "bird".

Methodology

Aim of this research is to determine children's mental models about birds, this is a social constructivist philosophy based hermeneutical phenomenology research. Social constructivist philosophy advocates that individuals build their opinions and angle of views from their daily experiences by analyzing and processing them with their knowledge process and create new opinions, concepts and phenomenon (Creswell, 2007). Phenomenological researches are the ones that trying to understand individuals' experiences on a concept or phenomenon (Crewell, 2007). General purpose in this researches is to gather data from participants' experiences (Fraenkell & Wallen, 2008). Phenomenological researches are named as hermeneutical phenomenology researches if they interpreted from writings or drawings (Creswell, 2007). In this research, data gathered from children's drawings and their explanations made by them, so it is designed as hermeneutical phenomenology research.

Working Group

Working group of the research is consisting of preschool students from preschools and primary schools in South-West of Turkey, Kastamonu City, Central District. Typical case sampling method has been used to form working group of this research. Purpose of this technique is to form working group from average and 'normal' participants that are accessible within population (Yıldırım & Şimşek, 2008; Creswell, 2007). Within the purpose of this research, to identify preschool students' mental model on birds, which are one of the animals seen on a daily basis, children have selected from schools with typical situations. Information about working group has shown in Table 1.

Table 1.

Demographic characteristics of the children in the working group

Sex	***Girl***		***Boy***		***Total***	
	f	*%*	*f*	*%*	*f*	*%*
Age 4	84	25.8	61	18.8	145	44.6
Age 5	99	30.5	81	24.9	180	55.4
Total	183	56.3	142	43.7	325	100.0

Gathering Data

Data of this research gathered from children's bird drawings and interviews made about that drawings. Data gathered by draw and explain technique in this research. Draw and explain is a technique which is used widely in literature and one of the most effective one to gather data from preschool students (Liu & Lin, 2015; Moseley, Desjean-Perrotta & Utley, 2010; Shepardson, Wee, Priddy & Harbor, 2007).

Data gathered from students of preschools and preschool students from primary schools in Kastamonu City Central District in fall term of 2015-2016 education year. Researcher had met with supervisor and preschool teacher in order to determine and organize schedule for gathering data and to have necessary permits. Data gathered in school at scheduled time and date. While papers have provided by researchers,

students used their own pencils in data gathering process. Half of an A4 paper has given to children and they are asked to draw a bird picture. In order to prevent children

from communicating each other, they separated into groups of three and researcher tried to stop their communication with each other as much as possible. Interviews after drawing phase have made in another room inside school. For children who didn't want to stay alone with researcher, a familiar school worker included in the meeting room to calm down the children. Semi-structured interview questions asked to child about the picture she drawn. While the drawings have been made collective, meetings have made individually. Drawings took around 25 minutes, and interviews took 15 minutes for each child. Protocol for gathering data is shown in Table 2.

Table 2.

Data acquisition protocol

Data Acquisition Protocol
Drawing Bird Picture 1- The child is asked to draw what comes to his/her mind when thinking of bird.
Verbal Explanation 1- Can you describe the bird you drawn in the picture? What are these birds doing? 2- Where do you see birds in your daily life? 3- What is the most significant property of a bird for you?

Analyzing Data

In the research, phenomenological analyze process which is suggested by Creswell (2007) carried out. This process consist of six steps. Firstly, experiences of participants about the studied concept should be determined. For this purpose, children have interviewed about their drawings and asked to tell if they have any story including birds. In second step, important situations are decided. In the scope of the research, children have interviewed about their memories and current knowledge about birds and important points tried to be detected. In the third step, important points gathered together. In research, answers of children gathered in bigger groups in different contents. While fourth step is to detect "what" participant experienced, fifth step is to identify how it experienced. With the questions asked in interview, effects of phenomenological experiences on mental model tried to understand. Lastly, in the sixth step, data gathered from other five steps are interpreted and adjudicated. Within the scope of the research, basic properties of birds included in drawings have compared with the results of the interviews and the overall findings were reached.

Researches not only classified some properties of birds drawn (for example: color selection, physical properties of bird, drawing style etc.) but also classified data gathered from interviews. After the researcher finished classification, data sent to an expert on biological and environmental education and he is asked to analyze the data. Kappa Measure of Agreement value has calculated for classification of both researcher and the expert. The kappa value calculated as .81. According to this result, it can be said that there is high compliance between two lists (Pallant, 2011).

Findings

Data of the research is consisting of drawings and opinions on them. In the research, firstly, results gathered from the drawings shared, then fundamental properties of drawings provided. After, findings from interviews are provided.

Table 3.

General properties from children's drawings

Feature in Drawing	*Age 4*		*Age 5*		*Total*	
	f	*%*	*f*	*%*	*f*	*%*
Drawing black and white	67	75.3	22	24.7	89	100.0
Drawing in color	78	33.1	158	66.9	236	100.0
List drawing	22	91.4	2	8.6	24	100.0
Exhibit drawing	17	37.0	29	63.0	46	100.0
Symbolic representation	34	38.6	54	61.4	88	100.0
Outline	72	43.1	95	56.9	167	100.0
Basic features (eg. Beak, legs, body, wings)	79	43.6	102	56.4	181	100.0
Behavior shown (eg. Walking, flying)	18	21.7	65	78.3	83	100.0
One plus drawn	0	0.0	1	100.0	1	100.0
No bird	1	50.0	1	50.0	2	100.0
Other type of bird (e.g. duck)	1	100.0	0	0.0	1	100.0
Basic features can not determined	46	80.7	11	19.3	57	100.0

Representing Bird (Drawings)

Drawings of children within working group evaluated in color usage, drawings style of bird figure and basic properties of drawings. All of these data is shown in Table 3.

By analyzing Table 3, it is seen that majority of children (*f*=167, *%*51.4) drawn birds as outline. Accordingly, children drawn bird figure with showing outline. In addition, some of the children (*f*=88, *%*27.1) drawn bird as a symbol. "V" and "M" are mostly used as symbols. Another significant result of the research is that only a small part of children (*f*=46, *%*14.2) made exhibit-type drawing. According to that, birds in pictures have drawn interacting with other objects and organisms. In drawings, trees used as mostly as organism interacting with birds. Sun and grass drawings also seen in these kind of drawings. Examples of children's drawings shown in Figure 1.

Picture explanation: Symbolic representation. Symbol used: "M". Colorful Drawing

Picture explanation: Exhibit style drawing. Colorful Drawing Behaviour Shown: Flying

Figure 1. Examples of children's drawings

Children from working group of this research generally drawn bird figure to show basic features of it (*f*=181, *%*55.7). Some of the children drawn bird while they show behavior (*f*=83, *%*25.5). There are different birds behavior in drawings. Table 4 shows this distribution.

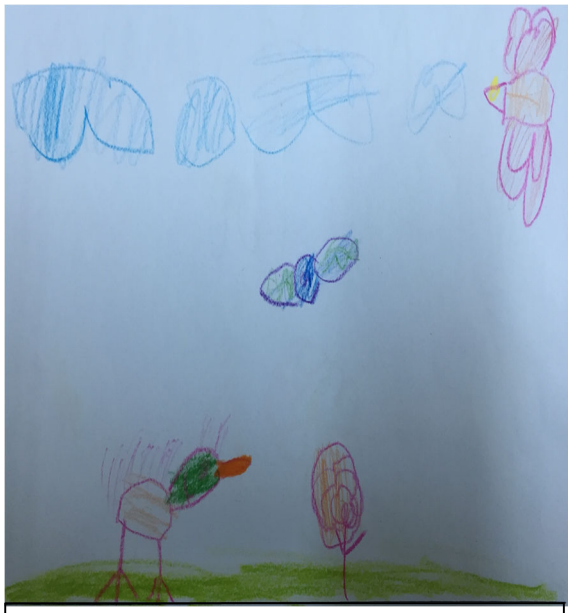
Table 4.

Bird behaviors seen on children's drawings

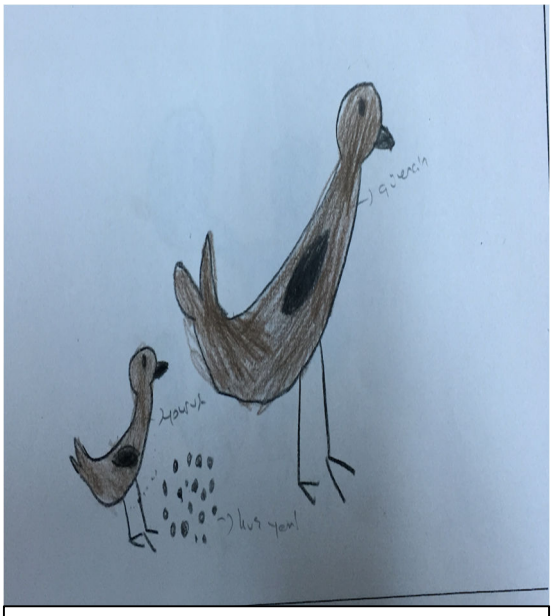
Behaviours Illustrated	***Age 4***		***Age 5***		***Total***	
	f	*%*	*f*	*%*	*f*	*%*
Feeding	2	50.0	2	50.0	4	100.0
Flying	9	14.5	53	85.5	62	100.0
Sitting in tree	0	0.0	4	100.0	4	100.0
Flocks fly	2	40.0	3	60.0	5	100.0
Walking on ground	5	62.5	3	37.5	8	100.0
Total	18	21.7	65	78.3	83	100.0

According to Table 4, drawings of working group that shows behavior of bird show it flying (*f*=62, *%*74.7). Accordingly, it can be said that children adopt flying as the most typical behavior of bird. C26 '*(...) because it is a bird. Flying in the air is its property';* C37 *'I think flying is what separates birds from other animals';* C186 *'Birds fly to go somewhere. That is why they are birds.*' One of the most significant results is birds have drawn while they are feeding themselves. While small amount of children drawn birds while they are feeding themselves (*f*=4, *%*4.8), in their age range, it is believed that this result is important about food chain knowledge. From children, C249 *'Birds eat*

worms (...)'; C11 *'These are bagels, birds can eat bagels on the floor'* we see their opinion on birds feeding behavior. Another significant result is that 5 years old children draw more behaving birds than 4 years old ones. Children's drawings about bird behaviors shown in Figure 2.



Picture explanation: Walking on the ground. Outline drawing



Picture explanation, Feeding mother and fledgling

Figure 2. Bird behaviors seen on children's drawings

Representing Bird (Interview)

As a result of the interviews, findings on where the children see birds mostly and what are the most remarkable properties of birds found. From this findings, implications on formation of mental models about bird concept can be interpreted. Table 5 shows answers of children when they asked the place they see birds.

Table 5.

Where children see birds frequently

Where They See Bird	***Age 4***		***Age 5***		***Total***	
	f	*%*	*f*	*%*	*f*	*%*
House	28	63.6	16	36.4	44	100.0
Outdoor	16	41.6	163	58.4	279	100.0
TV	1	50.0	1	50.0	2	100.0
Total	44	13.5	279	85.8	325	100.0

As seen in Table 5, majority of children (*f*=279, *%*85.8) see birds outdoor, as expected. Between outdoor mediums, rural area expressed mostly (*f*= 183, *%*56.3). In outdoor mediums, it is remarkable that mosque has specified by 40 children (%12.3). There is an ancient mosque in the centrum of Kastamonu City, where this research made, and people feeding birds in its garden Because of this Nasrullah Mosque identified with birds. (Picture 1) Kastamonu is a small city, and people are generally walk around Nasrullah Mosque. This situation is also valid for children. Some of the children in interview made this statement C57 *'I saw at Nasrullah Mosque. 'My father's workplace is near. I always see birds at there. I love them.',* C309 *'I see at the central mosque (meaning Nasrullah Mosque). They are always there. I also feed them.'* and C193 *'I feed them around Nasrullah Mosque. There are lots of them at there. It makes me afraid when they fly. But I love them.'* This is seen as evidence to effect of social environment for building mental model and stands out as an important finding. 44 children from working group said that they pet birds at home (*%*13.5). Only one child stated they he saw bird on TV.

Picture 1. Nasrullah Square (06.11.2015)

Children asked to identify bird's most remarkable property in interviews. Thus, children's perspective on separating birds from other animals tried to be detected. Findings on this are shown in Table 6.

Table 6.

Remarkable Bird Properties According to Children

Most remarkable Property of Bird	*Age 4*		*Age 5*		*Total*	
	f	*%*	*f*	*%*	*f*	*%*
Foot	9	42.9	12	57.1	21	100.0
Beak	23	41.1	33	58.9	56	100.0
Eye	3	33.3	6	66.7	9	100.0
Wing	16	34.8	30	65.2	46	100.0
Color	5	25.0	15	75.0	20	100.0
Sound	3	60.0	2	40.0	5	100.0
Feather	15	57.7	11	42.3	26	100.0
Ability to fly	64	50.4	63	49.6	127	100.0
Reproductively	3	50.0	3	50.0	6	100.0
Nest	4	44.4	5	55.6	9	100.0

When findings on Table 6 reviewed, it is seen that majority of the children underlined physical properties of birds. Children mostly find bird's ability to fly remarkably. Significant amount of children from working group named bird's ability to fly as the most remarkable property (*f*= 127, *%*39.1). Accordingly, some opinions are those: C273 '*I mostly like their ability to fly I thing flying is a beautiful thing.',* C118 *'The first thing I think about birds is their ability to fly. For me, best property is to fly.'* After ability to fly, beaks of birds have underlined mostly. 56 children stated beaks as the most remarkable part (*%*17.2). Most striking findings about children's view on beak is that they compare beak with human mouth and they find beak different and interesting. Also, they find birds feeding with their beaks interesting. A five years old child *'Birds' beaks are funny. Its tip is sharp, not like us. (...) I think their mouths are beautiful. By this way, they can eat worms. If they had mouths like us, they can not eat from ground.'* are most common comments. Similar opinions have told by other children too. According to these findings, children's ability to make teleological explanations about bird beak and their ability to differentiate human mouth from bird beak detected.

Additionally, some children stated wings as a remarkable property of bird (*f*= 46, *%*14.2). They develop special point of view on wings because they see it as a special flying organ. A four-year-old child, C271 *'Most remarkable property of bird is wings. They can not fly without wings. That is why wings are important for them.'* 26 children from working group (*%*8.0) finds birds' feathers remarkable. Generally, it is believed that feathers are keeping birds warm. C79 *'Feathers protect birds from cold. Without feathers, they can not survive on streets.'* are most common comments. 21 children said that birds' feet are very different and it is their significant property. Some of the children can explain different feet of birds teleologically. Five years old C318 *'If birds' feet were not the way they are, they can not hold on tree branches. They would fall.'* and four years old C103 'If their feet were not thin as they are, they could not hold on electric cables. *They have 3 fingers in their foot and they wrap cable.'* are most common comments. According to these, event it is limited, it is seen that children have ability to explain structural properties and duties of organs. Another interesting finding on Table 6 is that six children (*%*1.8) explained their opinion about reproductivity of birds. C9 *'I like that birds laying eggs. How they put it out? I think it is weird.'* is the comment.

Results and Discusiion

This research aims to define children's mental model on one of the animal species, birds by analyzing their drawings. Different experiences or parts can be detected from drawings (Hall, 2009). This research has studied children's drawings from different aspects and variables. Accordingly, most of the children made colorful drawings (*f*=236). While 78 (*%*33.1) of the children who drawn colorful are four years old, remaining 158 (*%*66.9) children are five years old. In his research, Tunnicliffe (2011) also found that children with higher age are using more colors in their drawings. Result of this research is coinciding with Tunnicliffe's (2011) research.

When analyzing children's bird drawing style, it is seen that majority (*f*=167) of them draw main lines of bird, then leave inside empty to make outline drawing. 88 of children used symbols for drawing bird, mostly used symbols are 'V' and 'M'. In Tunnicliffe's (2011) research, there were also children that draw symbol instead of birds, and English children frequently used 'V' symbol too. Considering similar results of both researches, finding similar symbols for same concept (bird) is supporting universal dimensions on genetic epistemology knowledge gathering and showing it (Piaget, 1970). 46 children from working group draw picture as exhibit style drawing, interacting with different objects. These objects are schemas related mental models. Most frequently used codes are tree, sun and grass. Children's ability to draw detailed pictures about birds can be result of their knowledge on birds which is more than any other animal (Bowker, 2007). Mental models are consisting of more than one schemas and there are relations between these schemas (Seal, 2006). Similar schemas in bird drawings have detected in Tunnicliffe's (2011) research. Drawings are important tools for detecting schemas that children have (Fello, Raquette & Jalango, 2006).

When analyzing drawing styles generally, having more outline drawing style and less exhibit style is not a surprise. There are lots of factors that effect quality and content of the drawings. Child's linear development may cause limitations on ability to transfer knowledge to work (White & Gunstone, 1992). This can never have interpreted as cognitive deficiency. Anning and Ring (2004) defend similar view on this topic, underlines linear development on drawing quality. Hall (2009) defends that by using drawings, children perceive surrounding figures and actions better, and experience gathered by aging increases details on drawings. According to these, having more exhibit style drawings from five years old children verifies this opinion.

Braund (1998) states that drawing styles and sizes of animal figures in pictures are important variables that children (especially in younger age group) use in defining animals. In animal drawings, birds are pictured way better than other animals (Tunnicliffe & Reiss, 1999). 188 children from working group (*%*57.8) drawn bird with basic anatomic features like two feet, two wings and beak. This result coinciding with Tunnicliffe's (2011) research. Çardak (2009) and Prokop, Kubiatko and Fancovicova (2007) also specify children's ability to say physical properties of birds better. Knowledge on a concept generally coded from its distinctive visible properties and early schemas of mental models generally belongs to these properties (Bruning, Schraw & Norby, 2014). Similarly, Inagaki and Hatano (2006) says in early mental models about biological concepts, this basic features and mental process on this concept are significant. Although this kind of process may help developing misconceptions (Çardak, 2009; Prokop, Kubiatko and Fancovicova, 2008), it is important because these are first structures on mental models. From this results, it can be said that more than half of children from working group (*f*=188, *%*57.8) developed basic anatomical features related to birds inside their mental models.

Children obtain living-world knowledge from real and visual experiences (Tunnicliffe, 2011). These experiences are very important to understand any concept (White &

Gunstone, 1992). In this research, majority of children (*f*=279, *%*85.8) remarked they mostly see birds in outside mediums. Cinici (2013) underlines importance of observation in development of children's basic knowledge about livings. Prokop et al. (2007) also states that child's experience about animals are based on direct observations in nature.

Vygotsky (1971) specifies learning process as a part of social environment and every information created have traces from cultural, historical or sociological background. Mental models also include these factors as Vygotsky (1971) states and affected from them (Franco and Colinvaux, 2000). Also, Young (2008) underlines the effect of living area on mental model development. According to all of these, 40 children's (*%*1.2) understanding of combining Nasrullah Mosque with bird concept can be accepted clearly. It is an expected result that an area where humans and birds interact frequently took place in children's minds and being identical, since children are also individuals who live in Kastamonu. This is a salient result in a way it shows mental model development and lifestyle's effect on it.

Another important result of this research is that 44 children petting bird house environment and highlighting their experience in house medium. According to Tunnicliffe et al. (2008), house is an important environment for gathering information and experiences. Prokop, Kubiatko and Fancovicova (2007) underlines that children who pet and observe birds in house environment have better and more knowledge about them. This can be explained with frequent and personal experiences of child with bird and this frequent relation is important to define basic features of animals (Prokop, et al., 2007). While some researches remarks TV, internet and other media mediums effective for learning and seeing animals (Prokop et al., 2007; Tunnicliffe & Reiss, 1999; Tunnicliffe, et al., 2008), only two children from this research (%0.8) said that they saw bird in TV. According to Çardak (2009), as a result of children's living area shift from natural areas to interiors, magazine, book, TV and internet are new mediums they are getting knowledge about animal's physical properties and this cause misconception.

Prokop et al. (2007) states that children can keep animal's remarkable properties in their minds easily. Besides, as Prokop, Kubiatko and Fancovicova (2007) state, it is way easier to categorize from their basic properties in childhood term. Significant amount of children from working group named birds ability to fly as the most remarkable property (*f*=127, *%*39.1). 56 children (%17.2) beak and 46 children (*%*14.1) find wings remarkable. One of the most important finding is six children's opinion as finding reproductivity (egg) remarkable (%1.8). Additionally, feather (*f*=26, *%*8.0), foot (*f*=21, *%*6.4), nest (*f*=9, *%*2.7) and sound (*f*=5, *%*1.5) particularly underlined. Final results coinciding with Tunnicliffe's (2011) research. Similarly, both research found bird's basic anatomical features like wing, beak, foot as most remarkable properties. Tunnicliffe (2011) also states reproductivity (egg) highlighting. In this research, children underline nourishment while they talk about beak and eye properties. This is also an important result. Current preschool curriculum in Turkey (MEB, 2016) does not include enough emphasis on food chain concept. Even so, children's emphasis on bird's nourishment properties is remarkable. Also, as Prokop, Kubiatko and Fancovicova (2007) state, it is way easier to categorize from their basic properties in childhood term.

From the results of this research, even children's mental model about birds does not have biological basis, it is sufficient in figurative and basic property basis, and adequate for their age. Additionally, it is detected that children see birds generally at outdoor environments. From these results, it is determined that there must be more effort to teach children about biological knowledge of animals. In the curriculum run in Turkey preschool education system, (MEB, 2016) there is not any direct topic towards animals, only Recovery 10 as *'animals living around us'* specified in social-emotional

development. Additionally, 4 October Animal Protection Day included in specific days and weeks as need to be addressed. Researcher thinks that these are not enough themselves. That is why direct acquisition in order to develop biological knowledge about animals, and also for protecting, loving etc. should be included in preschool education curriculum. From the findings, as children mostly observe animals outdoor, science and nature events that have direct contact with animals, and drama educations should be planned and included natural environment with different materials (book, magazine, internet etc.).

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RESEARCH ARTICLE

Uçan, Tüylü ve Gagalı Şeyler: Çocukların Kuş Hakkındaki Zihinsel Modelleri

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Özet

Bu araştırmanın amacı okul öncesi eğitim alan çocukların kuş hakkındaki zihinsel modellerini çizimler aracılığıyla belirlemektir. Araştırma sosyal yapısalcı felsefe temelinde yürütülen bir heuristik fenomenoloji araştırmasıdır. Araştırma için çalışma grubunun oluşturulmasında tipik durum örnekleme tekniği kullanılmıştır. Araştırmanın çalışma grubunu Kastamonu İl'i Merkez İlçe'sinde okul öncesi eğitim alan 325 çocuk oluşturmaktadır. Araştırma kapsamında veriler çiz ve açıkla tekniği kullanılarak toplanmıştır. Çocuklardan öncelikle bir kuş resmi çizmeleri istenmiş, sonrasında çizimleri üzerinden yarı-yapılandırılmış görüşme yapılmıştır. Çalışma grubundan elde edilen veriler incelendiğinde çocukların önemli bir bölümünün (*f*=167, *%*=51.3) kuşu ana hatları çizilmiş tarzda çizdikleri belirlenmiştir. 181 çocuk (*f*=181, *%*=55.6) kuşa ait temel özellikleri çizmiş, 83 çocuk (*%*=25.5) kuşu davranış gösterirken şeklinde çizmiştir. Çocukların çok büyük bir bölümü (*f*=279, *%*=85.8) kuşu açık hava mekanlarda gördüğünü belirtmiş ve yine çok sayıda çocuk (*f*=127, *%*=39.0) kuşa ait en temel özelliğin uçmak olduğunu belirtmiştir. Elde edilen bulgular dikkate alındığında çocukların kuşlar hakkında biyolojik temelli olmayan ancak, temel fiziksel ve şekilsel özelliklere sahip zihinsel modellere sahip oldukları sonucuna ulaşılmıştır. Ayrıca çocukların kuş kavramına ait temel bilgileri açık hava mekanlardan edindikleri de belirlenmiştir. Bu sonuçlar ışığında Türkiye'deki okul öncesi eğitim programında hayvanlara yönelik doğrudan kazanımlara yer verilmesi gerektiği ve verilecek eğitimin mümkün oldukça açık hava mekanlarda, hayvanları doğrudan gözlemlemeye ve doğrudan deneyimlemeye izin verecek şekilde tasarlanmasının önemli olduğu vurgulanmaktadır.

Anahtar Kelimeler: Kuş, çiz ve anlat, zihinsel model. çocuk.

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