

## Acquisition of sibling and family concepts: A Piagetian study

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### Abstract

The purpose of this study is to evaluate the acquisition of sibling and family concepts of children aged 9 and 11 in regard to gender, age and socio-economic status (SES) variables. 'Siblings Test' developed by Piaget is used as an assessment tool. A total of 200 students in the 3rd and 5th grades form the participating group of the study. The findings obtained from the quantitative and qualitative data were evaluated according to age, gender and SES variables. The relative concepts are acquired in Piaget's suggested time and systematic in children aged 9–11 in medium and high SES. However, it is below the expected acquisition in low SES in both the age groups.

Keywords: Piaget, relative concepts, socio-economic status, sibling, family.

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## 1. Introduction

Piaget's study in 1924 pioneered the acquisition of conceptual relativity. At the end of these studies, Piaget (1928/2007) stated that reasoning, which is a part of relative concepts, is the main factor of intelligence. Understanding of how a concept is perceived by another person is the relativity of this concept. The meaning of relative concepts changes according to each individual, object and place (Levinson, 1996). The relative concepts are significant in the context of the difficulties in the comprehension of the logic of relations and understanding meronymy (part-whole relation).

Relative concepts encounter us as the concepts of kinship, the concept of homeland, the concepts of left-right, the spatial concepts and the concept of sibling. It can be concluded that a specific stage is followed in acquiring all these concepts. Children first understand the concept from their own point of view and then they evaluate this concept from other people's points of view, gaining some perspective (Anglin, 1985; Bacanli, 2002; Erten-Tatli, 2013; Kuczaj & Maratsos, 1975; Piaget, 1928/2007).

A child can establish contact with other people only if he/she is older than 7 years and he/she can overcome his/her 'egocentrism', using Piaget's term, only after that age. Accordingly, overcoming his/her own egocentrism is also the time when he/she encounters relative concepts that vary from person to person, object to object and situation to situation. The child who does not comprehend other objects and persons apart from himself/herself is undoubtedly unaware of the existence of concepts apart from his/hers (Bacanli, 2002). In their study in which they analyse the development of relative concepts, Swart and Hall (1972), as well, state that the acquisition of these concepts takes place through three stages: 1) egocentrism (mostly 5 years old), 2) socialisation (7-9 years old) and 3) objectivity (9-11 years old). The child is also required to think according to other people's points of view after he/she comprehends the existence of them. The child can build reciprocal relationships with his/her social and objective environment only after this stage.

### 1.1. Acquisition of sibling and family concepts

Because the concepts of sibling and family, parts of relative concepts, are involved in life on their own, they are considered as significant notions; while we encounter the concept of sibling as can be examined in terms of the logic of relations and the concept of family in terms of meronymy (Piaget, 1928/2007). Piaget states that a simple and everyday relationship, such as the relationship of siblings, is not even grasped at the age of 9-10, and that it demonstrates the significance of the logic of relations. Reality in the child, namely the inability to understand the relativity of concepts, is one of the main obstacles to the development of a child's reasoning (Piaget, 1928/2007).

The rate of accurate definitions of the concept of sibling demonstrates an increment starting from the age of 7. There is no particular difference between children with no siblings and others (Piaget, 1928/2007). The comprehension of the concepts of sibling and kinship is divided into conceptual levels in conjunction with age (Dangizer, 1957; Elkind, 1962; Swart & Hall, 1972) and increases in parallel with age (Bacanli, 2002; Benson & Anglin, 1987; Chambers & Tavuchis, 1976; Elkind, 1962; Erten Tatli, 2013; Piaget, 1928/2007). While describing the semantic properties in kinship terms, Haviland and Clark (1974) pointed out that semantically more complex terms are acquired later than terms with less specificity. Accordingly, the terms grandmother and grandfather are more complex than the terms mother and father. The terms sister and brother are also more complex and are acquired later than the terms mother, father, daughter and son.

In order to observe the logic of relation, Piaget (1928/2007) applies the test 'Three Siblings' to the children aged 4-12 and asks questions about their own sisters and brothers. Only 12-year-olds are able to figure out how many siblings their own sisters or brothers have. For 10 year-old children, the rate is 75%. The number of children in the family is solved by 75% of the children, starting at the age of

6. It means that the great difference between these questions is that the logic of relations is different from the judgment of belonging, and the judgment of the belonging is easier than the logic of relations. Yet another point that Piaget finds remarkable is that not all the children, especially the younger ones, solving the question of how many siblings their own sisters or brothers have, can solve the question of the number of siblings in the family, but this situation changes starting at the age of 8–9. Ten-year olds are able to tell how many daughters or sons their families have, and tell how many sisters or brothers each of them has (Piaget, 1928/2007).

Children's difficulties regarding the concept of siblings can be attributed to the egocentrism of thought. Namely, a child consistently thinks according to his/her own point of view and does not take notice of the opinions of siblings. The solution of questions regarding the child's own family is related to the solutions in the cases where any family is discussed. Thus, it appears at the same age (Piaget, 1928/2007).

The determination of when the concept of sibling is acquired also implies the determination of when the symmetric relations proposed by Russell are acquired. Symmetric relations is the requirement that the relationship between A and B is the same as between B and A. The acquisition of the concept of sibling can be explained by these relations (Bacanli, 2002).

Elkind (1962) mentions about two dimensions of the acquisition of the concept of sibling. From these dimensions, the first is the concept of sibling and initially acquired. The second is having a sibling. Swart and Hall (1972) noted a similar phase in their work and indicated that abstract tasks related to the concept of sibling could be achieved at older ages. Also, in the study of Bacanli (2002), the findings related to the concept of sibling seem to be similar to the findings of Piaget. However, it is observed that the number of siblings of another child and the total number of children in the family have not yet been solved by the children in this study. Another study in Turkey reveals that the content of the definitions changes although it shows similar results regarding to the siblings test (Erten-Tatli, 2013).

Regarding the concept of the family, a relative concept, Piaget (1928/2007) states that the concept includes meronymy. The definition means awareness; the more automatized a definition is, the more difficult a concept or a relationship becomes self-aware. Children can use concepts such as sibling and uncle accurately during their speech, but sometimes they cannot define them. The concept of family is still verbal for children aged 7 and 9 years. In other words, the real concept that the child has in mind and whose definition gradually becomes self-aware is not yet a direct and spontaneous product of an idea, but is formed by the force of the adult language. Piaget states that the concept of the family has gone through three stages. At the first stage, the child calls the family as the people around him/her. He/she is not interested in kinship relationships and defines family with places or names. In the second stage, although the child bases upon the concept of family, he/she limits family by the relatives that are around him/her. In the third stage, the definition now includes all kinds of kinship.

The enrichment of definitions while relativity of the concept is not acquired can be explained by the concept of 'verbal precocity', proposed by Elkind (1999). Besides, similar findings are found in two studies conducted in Turkey with 27-year intervals. These findings differed from Piaget's findings, suggesting that conceptual relativism is more influenced by culture (Erten-Tatli, 2013).

Piaget emphasises the importance of social causes in the development of the human mind, and states that the rate of children's development varies from culture to culture (Gunce, 1973). Other than culture, it is observed that there are other factors that affect the cognitive development of the child. Morgan (2000) notes that there are data that will allow us to predict that children who are given up for adoption to homes with superior conditions will be able to acquire a range of 10–15 intelligence quotients. It has been observed that there is a high level of relationship between the environmental conditions and cognitive development, and that the cognitive development of children aged 8–11 growing up in a family environment is superior to that of children growing up in an institutional

environment (Arik & Gorus, 1990). When evaluated in terms of variables such as socio-economic status (SES) and environment, it is stated that being in interaction with objects contributes to the development of conservation (Price-Williams, Gordon & Ramirez, 1969). The characteristics of the family environment of a child play a fundamental role in determining the development of the child (Ustunoglu, 1991).

Few studies have been found on the acquisition of relative concepts. It is observed, taking into account the fact that conceptual relativism is related to many aspects of cognitive development (Bacanli, 2002; Piaget, 1947/2005; Piaget, 1928/2007) and the importance of cultural differences (Erten-Tatli, 2013; Gautam, 1999; Swanson & Benton, 1955; Zhou, Peverly, Boehm & Chongle, 2007), it is considered significant to analyse the conceptual relativity of children in Turkey. Two previous studies on relative concepts in Turkey were carried out in small settlements (Bacanli, 1984; Erten Tatli, 2013). It is figured that the children in the city centre should also be analysed, considering that they may have different cultural characteristics.

## **2. Method**

### *2.1. Model of research*

The research is a descriptive study in the survey model. The studies have been made to describe the acquisition of conceptual relativity. In addition, it has been examined whether there is a relationship between conceptual relativity and, age and gender. A survey research is a type of research involving the collection of data on people's views in order to test hypotheses about a topic, a book/magazine/publication or a topic being discussed or to search for answers to research questions. It is used to gather information about a group's beliefs, attitudes, behaviour and demographic characteristics (Gay, Mills & Airasian, 2009).

### *2.2. Participants*

The study group is constituted of 200 people, randomly selected among the 3rd (aged 9) and 5th (aged 11) grade students, attending three primary and three secondary schools affiliated in the central districts of Ankara province, in lower, middle and upper SES. The four students are excluded from the group as they are diagnosed with mental retardation and three students are excluded because they are foreign nationals and do not speak Turkish.

For participants, there are 102 students aged 9 (n girl = 56, n boy = 46), 98 students aged 11 (n girl = 58, n boy = 40). The total participants are 200, the lower SES ( $n = 80$ ), middle SES ( $n = 60$ ) and the upper SES ( $n = 60$ ). The research aims to determine the conceptual relativity of children in primary schools in Turkey.

### *2.3. Measures*

The Siblings Test: This test was developed by Piaget. The concept of sibling has been the subject in the test. With six questions in this test, it is determined how much the child can internalise the concept of sibling by carrying out increasingly difficult logic operations on the concept. Bacanli (1984), in his study, makes the proper names in the test Turkish. Attention has been paid to the presence of names that the children frequently hear (Bacanli, 1984). The sibling test has been carried out in this study in the form of Bacanli's (1984) study. In addition to the test, participants have been asked to identify sibling and family concepts.

## 2.4. Procedure

Participation of volunteer participants is ensured by taking permission from school administrators for the research. In the research, data on conceptual relativity of children are collected through individual interviews with children. The students' answers are reported in the questionnaire during the interview. The students are interviewed taking into account the list order and the interviews are conducted in the school counselling unit.

## 2.5. Data analysis

In the evaluation of the test, correct answers are coded as '1' and false answers as '0'. Consistency between encoders is not considered when interview forms are evaluated. The percentages of the data recorded in the SPSS 22.0 data analysis program are calculated. The results for age and sex are evaluated with the Mann–Whitney U test and the SES findings are evaluated with the Kruskal Wallis test.

The responses are evaluated by taking into account the definitions of Piaget (1928/2007) and Bacanlı (1984) in the questions concerning the sibling and the family. When the concept of sibling is evaluated, what kinds of errors are made for each age are analysed. In evaluating the concept of family, the answers are coded according to Piaget's classification and the percentages are calculated. All the results are evaluated comparatively with respect to age and SES.

## 3. Results

### 3.1. Results regarding the sibling test

Table 1 shows that the numbers and percentages of participants who receive 1 point are shown by giving the correct answer for the six questions in the siblings test. The success criterion is accepted as the 75% limit that Piaget approves. Findings related to the questions of the siblings test are given below.

Table 1. The results regarding the sibling test

Questions		Lower SES		Middle SED		Upper SED	
		N	%	N	%	N	%
1	aged 9	21	52.5	22	78.5	26	76.4
	aged 11	31	77.5	31	96.8	22	84.6
2	aged 9	23	57.5	22	78.5	30	88.2
	aged 11	29	72.5	29	90.6	25	96.1
3	aged 9	28	70	25	89.2	31	91.1
	aged 11	26	65	28	87.5	25	96.1
4	aged 9	30	75	24	85.7	30	88.2
	aged 11	38	95	31	96.8	25	96.1
5	aged 9	23	57.5	22	78.5	30	88.2
	aged 11	24	60	28	87.5	22	84.6
6	aged 9	18	45	19	67.8	26	70.5
	aged 11	24	60	24	75	21	80.7

#### 3.1.1. Results regarding the first question of the sibling test

For the percentages calculated according to the answers given for the first question of the sibling test (How many brothers do you have? How many sisters do you have? (Suggesting that the sibling of the child is A: How many brothers and sisters does A have?)), 52.5% correct answers are received from

the children aged 9 in lower SES. The question has been considered unsuccessful because it is below the 75% limit stated by Piaget. The question is achieved by the 9-year olds in the middle SES (78.5%) and the upper SES (76.4%). For the children aged 11, the question is observed to be achieved in the Lower (77.5%), Middle (96.8%) and Upper SES (84.6%). There is a significant difference in this question among children according to age ( $U = 4095$ ,  $p = 0.003$ ), sex ( $U = 3923$ ,  $p = 0.001$ ) and SES ( $\chi^2 = 10.913$ ,  $p = 0.004$ ).

### 3.1.2. Results regarding the second question of the sibling test

In the answers given for the second question of the sibling test (How many brothers and sisters does your family have? How many siblings are all of them?), it is observed that the question cannot be achieved in children aged 9 and 11 in lower SES (Aged 9 57.5%; Aged 11 72.5%), but is achieved in middle (Aged 9 78.5%; Aged 11 90.6%) and upper SESs. (Aged 9 88.2%; Aged 11 96.1%). While there is no significant difference between age ( $U = 4440$ ,  $p = 0.05$ ) and sex ( $U = 4608$ ,  $p = 0.30$ ), there is a significant difference for SES ( $\chi^2 = 16.473$ ,  $p = 0.000$ ) for this question.

### 3.1.3. Results regarding the third question of the sibling test

According to the answers given for the third question (There are three brothers in a family; Ali, Veli and Mehmet. How many brothers does Ali have? Veli? Mehmet?), it is observed that the question cannot be achieved in aged 9 and 11 in lower SES (Aged 9 70%; Aged 11 65%), but is achieved in middle (Aged 9 89.2%; Aged 11 87.5%) and upper SESs. (Aged 9 91.1%; Aged 11 96.1%). While there is no significant difference between age ( $U = 4911$ ,  $p = 0.75$ ) and sex ( $U = 4493$ ,  $p = 0.13$ ), there is a significant difference for SES ( $\chi^2 = 17.741$ ,  $p = 0.000$ ) for this question.

### 3.1.4. Results regarding the fourth question of the sibling test

When the answers given to the fourth question of the sibling test (Are you brother/ sister? What does sibling mean?) are analysed, it can be observed that the question is achieved for aged 9 and 11, in lower SES (aged 9 75%; aged 11 85.7%), middle SES (aged 9 88.2%; aged 11 95%) and the upper SES (aged 9 96.8%; aged 11 96.1%). While there is no significant difference according to SES ( $\chi^2 = 2.168$ ,  $p = 0.33$ ) and sex ( $U = 4548$ ,  $p = 0.10$ ), there is a significant difference according to age ( $U = 4320$ ,  $p = 0.002$ ) for this question.

When the results of the concept of sibling are observed, it is noteworthy that there is a lack of answers including the expressions about the fact that the concept of sibling is acquired in children aged 9. It is observed that the most mentioned point about the concept of sibling is that the sibling is expressed as a younger one. Apart from that, answers such as 'the person we live in the same house', 'love', 'sharing' are also received. In the case of children aged 11, there are statements of that to a large extent, all the children in the family can be named as sibling. In addition, there are children who define sibling as 'love, protection, support, sharing'.

### 3.1.5. Results regarding the fifth question of the sibling test

While the fifth question of the sibling test (Mustafa has three brothers: Hüseyin, Osman and Murat. How many siblings does Hüseyin have? Osman? Murat?) cannot be achieved in lower SES for aged 9 (57.5%) and 11 (60%), it is achieved in middle SES (Aged 9 78.5%; aged 11 87.5%) and upper SES (aged 9 88.2%; aged 11 84.6%). While there is no significant difference according to age ( $U = 4899$ ,  $p = 0.74$ ) and sex ( $U = 4395$ ,  $p = 0.09$ ), there is a significant difference according to SES ( $\chi^2 = 17.498$ ,  $p = 0.000$ ) for this question.

### 3.1.6. Results regarding the sixth question of the sibling test

The sixth question of the sibling test (How many siblings does the family have? in 5th question) cannot be achieved in the lower SES for children aged 9 (45%) and 11 (60%). It is observed that the question cannot be achieved in the middle (aged 9 67.8%; aged 11 75%) and upper SES (aged 9 70.5%; aged 11 80.7%) at aged 9 but is achieved at 11. While there is no significant difference according to age ( $U = 4866, p = 0.69$ ) and sex ( $U = 4526, p = 0.25$ ), there is a significant difference according to SES ( $\chi^2 = 11.336, p = 0.003$ ) for this question.

Table 2. Results regarding the concept of family for children aged 9 and 11

Groups		Lower SES		Middle SES		Upper SES		Total	
		N	%	N	%	N	%	N	%
1st group*	aged 9	6	15	3	10.7	3	8.8	12	6
	aged 11	5	12.5	3	9.3	1	3.8	9	4.5
2nd group*	aged 9	4	10	3	10.7	5	14.7	11	5.5
	aged 11	4	10	1	3.1	3	11.5	8	4
3rd group*	aged 9	25	62.5	19	67.8	24	70.5	68	32
	aged 11	14	35	25	78.1	20	76.9	59	29.5
Unanswered and unobtrusive answers	aged 9	5	12.5	3	10.7	2	5.8	10	5
	aged 11	17	42.5	3	9.3	2	7.6	22	11
Total	N	80	40	60	30	60	30	200	100

### 3.2. Results regarding the concept of family

\*Group 1: The ones defining family as 'living together', Group 2: The ones that cannot comprehend the concept of kinship and define family linking with home and living together. Group 3: The ones defining family with kinship.

As shown in Table 2, 12 (6%) of the children in the 9-year-old group and 9 (4.5%) of the children in the 11-year-old group defined the family as 'living together' (Group 1). There are 11 (4%) children aged 9 and 8 (4%) children aged 11 who cannot comprehend kinship thoughts, by linking the family to being in the same house (Group 2). There are 68 (32%) children aged 9 and 59 (29.5%) children aged 11 who define family with kinship (Group 3). There are 10 (5%) children aged 9 and 22 (11%) children aged 11 who leave the questions unanswered and who give unobtrusive answers.

It is supposed that the fact that the 3rd group definitions, which show that the concept of the family has been acquired and include a kinship relation, have a higher percentage than 9 years of age is due to the responses of the lower SES participants. As can be observed in Table 2, middle and upper SES participants are higher in the 3rd group at the age 11. In the lower SES, the students aged 11 give 4th group answers (unanswered and the answers which are not included in groups). The content of these answers usually includes situations like love, happiness, sharing. There are 57 children in the age group of 9 and 26 in the age group of 11, who make the definition of family as a core and extended family.

## 4. Discussion

This study aimed to examine the acquisition of the concepts of sibling and family of children aged 9 and 11 by focusing on conceptual relativity of children in different socio-economic levels. The results show that socio-economic level is significant in the acquisition of the concepts of sibling and family.

The meanings of the relative concepts vary according to the person, the object and the place (Levinson, 1996), and one needs to be able to gain perspectives in order to fully acquire these concepts (Anglin, 1985, Piaget, 1928/2007). In this study, it is observed that the children in the lower

SES regarding to the acquisition of the concept of sibling have not succeeded in taking perspective at 9–11 years yet. This situation (Piaget, 1928/2007), which Piaget attributed to the idea of egocentrism, also manifests itself in the mistakes that children make when describing their siblings. While 9-year-old children tend to describe their siblings as 'little children at home', 11-year olds define substantially as 'children in the family'. No significant difference according to SESs has been revealed in the definition of sibling.

When the results of the sibling test are evaluated, it appears that Piaget's conceptualisation relativity is appropriate for children aged 9 and 11 in the middle and upper SES. The 9-year-old children in the lower SES only succeeded in asking 'Are you a sibling?' (Question 4). Again, the 11-year-old children in the lower SES succeeded in two questions. The first question from these questions is 'How many brothers does your family have, how many sisters does your family have, how many siblings are all of them?' (Question 1), while the other is 'Are you a sibling?' (Question 4).

An interesting finding from the study is that in the sibling test, 11-year-old children in the lower SES have underperformed than 9-year-old children in the middle and upper SES. This finding suggests that relative concepts are influenced by culture (Gunce, 1973) and socio-economic level (Gordon & Ramirez, 1969; Morgan, 2000). A similar difference is observed in the acquisition of children regarding to the concept of family and low performance is observed in children in the lower socio-economic level. As a result, it has been seen that relative concepts have been acquired in the time and systematics proposed by Piaget in 9–11 year old children in the middle and upper SES. On the lower socio-economic level, it has been found that it is below the expected acquisition in both age groups. It is considered that in the future researches, a detailed study of the family conditions and the cultural environment of children in the acquisition of relative concepts in the future will be of importance in terms of literature.



## References

- Anglin, J. (1985). Knowledge of word concepts: What preschoolers say about the meanings of some nouns and verbs. *Children's Language*, 5, 78–128.
- Bacanlı, H. (1984). *Cocukta goreli kavramlarin kazanilmasi* (Unpublished Master Thesis). Educational Science Institute, Ankara University, Turkey.
- Bacanlı, H. (2002). *Psikolojik kavram analizleri*. Ankara, Turkey: Nobel Yayin Dağıtım.
- Benson, N. J. & Anglin, J. M. (1987). The child's knowledge of English kin terms. *First Language*, 7, 41–66.
- Chambers, J. C., Jr. & Tavuchis, N. (1976). Kids and kin: Children's understanding of American kin terms. *Journal of Child Language*, 3(1), 63–80.
- Danziger, K. (1957). The child's understanding of kinship terms: A study in the development of relational concepts. *The Journal of Genetic Psychology: Research and Theory on Human Development*, 91, 213–232.
- Elkind, D. (1962). Children's conceptions of brother and sister: Piaget replication study V [Abstract]. *The Journal of Genetic Psychology Research and Theory on Human Development*, 100, 129–136.
- Erten-Tatli, C. (2013). *Acquisition of the relational concepts: Replication after 27 years* (Unpublished Master Thesis). Educational Science Institute, Gazi University, Ankara, Turkey.
- Gautam, I. P. (1999). Development of correct use of right and left orientation in Nepalese young children. *Tribhuvan University Journal*, 22(1), 91–98.
- Guñe, G. (1971). Jean Piaget ve temel kuramsal fikirleri. *Ankara Universitesi Egitim Bilimleri Fakultesi Dergisi*, 1(4), 19–32.
- Jordan, V. B. (1980). Conserving kinship concepts: A developmental study in social cognition. *Child Development*, 51, 146–155.
- Kuczaj, S. A. & Maratsos, M. P. (1975). On the acquisition of front, back and side. *Child Development*, 46, 202–210.
- Levinson, S. C. (1996). *Relativity in spatial conception and description*. US: Cambridge University Press.
- Li, Y. S. (1999). *Turk dillerinde akrabalik adlari*. Istanbul, Turkey: Simurg Yayinlari.
- Piaget, J. (2005). *Cocugun gozuyle dunya* (I. Yerguz, cev.). Ankara, Turkey: Dost Kitabevi Yayinlari.
- Piaget, J. (2007). *Cocukta karar verme ve akil Yurutme* (S. E. Sivayusgil, Cev.). Ankara, Turkey: Palme Yayıncılık. (Original work published 1928)
- Swanson, R. & Benton, A. L. (1955). Some aspects of the genetic development of right-left discrimination. *Child Development*, 26(2), 124–133.
- Swart, K. & Hall, A. E. (1972). Development of relational concepts and word definition in children five through eleven. *Child Development*, 43, 239–244.
- Zhou, Z., Peeverly, S. T., Boehm, A. E. & Chongde, L. (2000). American and Chinese children's understanding of distance, time and speed interrelations. *Cognitive Development*, 15(2), 215–240.