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# THE EFFECTS OF BILINGUALISM ON COGNITIVE DEVELOPMENT: A CASE OF BILINGUAL CHILDREN IN IRAN

# İKİDİLLİLİĞİN BİLİŞSEL GELİŞİME OLAN ETKİLERİ: İRAN'DAKİ İKİDİLLİ ÇOCUKLARIN ÖRNEĞİ

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**ABSTRACT:** In Urmia city, many children learn and speak their first language (either Azari or Kurdish) at home and study all of their courses in Farsi throughout their education. This bilingual quality of education needs to be researched to attain high quality educational practices. The purpose of this study was to examine the effects of bilingualism on cognitive development. 135 primary bilingual and monolingual students in grades 1, 3, and 5 were tested. The data were collected through tests that rely on Piaget's theories. The major finding showed that increase in age predicted the cognitive development stages of children as hypothesized. It was also found that there are no signification differences between bilingual and monolingual groups on Piagetian tasks.

**Keywords:** bilingual, cognitive, azari, kurdish, urmia

**ÖZET :** Bu çalışmanın amacı, ikidilliliğin bilişsel gelişim üzerine olan etkisini incelemektir. 135 ilköğretim 1, 3 ve 5. sınıf öğrencisinin katıldığı bu çalışma Urumiye şehrinde yaşamakta olan öğrencilerin birinci dilleri Azerice ve Kürtçe ve okullarında öğrenim gördükleri dil de Farsçadır. Veri toplama aracı Piaget'nin yöntemlerine dayanarak hazırlanmış sınavlardan oluşmuştur. En temel bulgu hipotezimizi doğrular nitelikte olup yaşın bilişsel düzeyle ilgili olduğudur. Diğer bir bulgu da, Piaget ilkelerine göre tasarlanmış etkinliklerde iki ve tek dilli bireyler arasında önemli bir fark olmadığıdır.

**Anahtar sözcükler:** ikidilli, bilişsel, azeri, kürt, urumiye

## 1. INTRODUCTION

The relationships between bilingualism and cognitive development have been debated in the literature and have given rise to some controversy. Although most of the studies before the 1960s indicated that there was a negative relationship between bilingualism and cognitive functions, the majority of these studies had serious methodological weaknesses. They had showed that bilingual children suffered from a language handicap when measured by verbal tests of intelligence or academic performance (see review by Diaz, 1983). In 1962, for the first time in the literature on bilingualism, Peal and Lambert (1962) presented empirical data showing positive influence of bilingualism on children's cognitive ability. Their findings indicated that "balanced bilingual" children (those who were equally fluent in both languages) at ten years of age showed a higher level of verbal and non-verbal intelligence than monolingual children.

Being bilingual has also been shown in the literature to have some advantages over being monolingual. Because bilingual children have two referent symbols for most referents, they have alternative means for the expression of a given idea. As Ben-Zeev (1977a) noted, they become aware that there is a connection between an idea and its means of expression. In two studies involving middle-class Hebrew-English and lower class Spanish-English bilingual children, Ben-Zeev (1977a, 1977b) suggested that bilingual children developed an analytical strategy towards language to counter interference between their two languages. When it occurs, the interference between the two languages caused the child to develop strategies which accelerated linguistic and cognitive development.

The claim that learning a second language may have an effect on cognitive ability is based on the assumption that language takes a central part of cognitive activity. Piaget claims that the development of language is determined by the development of "causal schemata" which exists physically and biologically within the individual's cognitive system. Vygotsky perceives the process of language

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development as integration of an individual's social experiences and his or her biological predispositions (Oren & Ditza, 1981). According to Vygotsky's theory (1992), bilingualism can have profound effects on cognitive processes, depending on society's attitudes and actions toward the phenomenon. Vygotsky (1992) claimed that the bilingual child is able "to see a language as one particular system among many, to view its phenomena under more general categories, and this leads to awareness of his linguistic operation". He believed that language first served the child a social function, and then cognitive and communicative functions evolved.

Experience with two-language systems may enable bilinguals to have a precautious understanding of the arbitrariness of language. For example, researchers have demonstrated that bilingual children often verbalize the arbitrary link between words and referents (Cummins and Swain, 1986). Moreover, the ability to objectify language is linked to a capacity Piaget (1950) termed non-syncretism. Piaget theorized that "a person's intelligence develops as he or she adapts psychologically to their environment (Berger, 1983). Keats et al. (1977) examined the performance of Malaysian five- year old urban bilingual children in Malay - English and Chinese- English on operational tasks. No statistically significant difference between subjects was found on performance on the operational tasks. Saito-Horgan (1995) studied four groups of bilingual Hispanic children to determine their stages of cognitive development by engaging children with three Piagetian tasks involving classification, conservation of mass and conservation of area. None of the four groups was found to possess a cognitive advantage over monolingual students on the three tasks. Does it mean that bilingualism is unrelated to cognitive development? Probably not. As Saito-Horgan noted, all of the children came from subtractive bilingual programs which may signal that it potentially had positive impact on children's bilingualism and cognitive development. Bialystok (1999) studied the cognitive complexity and attention control in the bilingual mind. Her study included 60 children divided equally into age groups. The 30 children in the younger group ranged in age from 3,2 to 4,9 those in the older group ranged from 5,0 to 6,3.In addition, the children represented two linguistic groups. Half of the children were monolingual speakers of English (16 boys and 14 girls). The remaining children were bilingual speakers of English and Chinese. The children spoke Cantonese or Mandarin at home but English in the community and at school.

The purpose of this study is to examine the effects of bilingualism on cognitive development, so it is important to compare two groups of children; bilingual and monolingual since without comparing the two we cannot know the effects of bilingualism on cognition. As we mentioned, in Urmia city, all children receive their education in Farsi; other than their native language (Azari and Kurdish). So, we expected to find how bilingual children performed on cognitive tasks. Specifically, this study was designed to investigate the extent to which bilingualism in this area of country affected children's cognitive development in grades 1, 3, and 5. Thus, we examine and compare the relationship between bilingualism and cognitive development in Urmia city where children learn and speak their first language (Azari and Kurdish) at home and already literate in Farsi (second language) at school. Although parents used their native language (Kurdish, Azari) predominantly with their children, Farsi had already become the dominant language at school.

The research hypotheses we tested were:

1- According to Piaget's theory there is significant relationship between age and performance on cognitive tasks. Piaget believed that cognitive development involves four stages the middle two being pre-operations and concrete operations. Pre-operational children are between the ages of 2-7, while concrete children are 7-11. Both of these stages are organized around the theme of symbols. The last stage of cognitive development is formal operations. These stages indicate that cognitive development increase with age.

2- According to the studies from 1962 to the present, there is significant different between the performance of bilingual and monolingual children on Piaget's cognitive tasks.

## 2. METHOD

The subjects (N=135) were drawn from grades 1, 3, and 5 in twelve public schools located in Urmia city (North West Iran). The sample comprises 45 Kurdish language children (first grade 7 girls, 8 boys, third grade 8 girls, 7 boys, and fifth grade 7 boys, 8 girls), 45 Azari language children (first grade 7 boys, 8 girls; third grade 8 girls, 7 boys and fifth grade 8 boys, 7 girls) and 45 Farsi (Persian) language children (first grade 10 boys, 5 girls; third grade 9 boys, 6 girls and fifth grade 9 girls, 5 boys). The Kurdish and Azari children are bilingual and the Farsi language children are monolingual.

### 2.1. Material

The materials used were the standard procedure for testing operational thinking described by Piaget. We used some materials like dolls, flowers, beads, beakers, moist clay (paste) and scales. For measuring concepts we used Piaget's clinical interview. Children were tested individually and all testing was completed on school premises. The order of testing was: (1) quantity conservation, (2) weight conservation, (3) seriation, (4) classification, (5) space (spatial conservation).

### 2.2. Scoring

For scoring cognitive tasks, we used Tonezakis' (1975) procedure. Children were scored as conserver (3 points) if they gave explanations involving identity, reversibility and compensation, as transitional (2 points) if they acknowledged invariance but gave no satisfactory justification for their answers and as non-conservers (1 point if they denied conservation on at least two of three transformations. Each test lasted about 15 minutes. The tests were administered in the native languages of the children who participated this study. For analyzing these differences we used chi-square test.

## 3. RESULTS

Results are organized around the key questions: Firstly, did bilingual students' performance in cognitive tasks correlate with their age? Secondly, is there significant different between the performance of bilingual and monolingual children on Piaget's cognitive tasks? As shown in table 1, the results demonstrated that increase in age was predicted the cognitive development stage of children as hypothesized.

**Table 1: Means, Standard Deviations, and Number of Subjects in Cognitive Tasks (n=45)**

| Spatial | Classification | Serration | Weight | Quantity | Concept/ Age |
|---|---|---|---|---|---|
| | | | | | 6/ 4-7 |
| 1.4 | 1.11 | 1.91 | 1.42 | 2.53 | M |
| 0.8 | 0.32 | 0.7 | 0.52 | 0.5 | Sd |
| | | | | | 8/ 4-9 |
| 1.93 | 2.33 | 2.75 | 2.58 | 3 | .M |
| 1 | 0.57 | 0.48 | 0.49 | 0 | Sd |
| | | | | | 10/ 4-11 |
| 2.42 | 2.88 | 2.93 | 2.97 | 3 | M |
| 0.9 | 0.31 | 0.25 | 0.15 | 0 | Sd |

As shown in Table 2. The chi-square analyses of the distribution of children revealed significant differences ($P<0.01$) on the cognitive tasks. These results are in support of Piaget's theory on acquisition of conservations. The results indicated that children will be better on acquisition of cognitive tasks (concepts) by over the time.

**Table 2: Chi-Square Test for Age Groups on Cognitive Tasks**

| | Quantity | Weight | Seriation | Classification | Spatial |
|---|---|---|---|---|---|
| X | 49.73* | 107.98* | 61.57* | 118.33* | 25.58* |
| Df | 2 | 4 | 4 | 4 | 2 |
| Sig | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

P<0.01

According to the studies from 1952 to the present, there is a significant difference between bilingual and monolingual children on Piaget's cognitive tasks. So it seemed that the performance of Kurdish and Azari bilingual children to be better than Farsi monolingual children. In fact with hypothesis 2, we compared the bilingual and monolingual children on acquisition of cognitive concepts. Table 3 shows the data analysis of this task. In conservation of quantity, the performance of bilinguals and monolinguals are the same. In conservation of classification and space tasks, monolinguals performed better than bilinguals. In addition, in seriation task, the performance of Azari bilingual children was better than other groups. In sum, there are differences between bilinguals and monolinguals on Piaget's tasks, but it seems to be insignificant (X). The X values with df 2,4 sig level are 5.99, 9.49. P> 0.01, P>0.05

**Table 3: Means, and Standard Deviation of Bilingual and Monolingual in Cognitive Tasks**

| Concepts language | | quantity | weight | seriation | classification | Spatial |
|---|---|---|---|---|---|---|
| *Bilingual* | M | 2.82 | 2.33 | 2.44 | 2.04 | 1.85 |
| (*Kurdish)* | Sd | 0.38 | 0.82 | 0.72 | 0.92 | 0.91 |
| | N | 45 | 45 | 45 | 45 | 45 |
| *Bilingual* | M | 2.82 | 2.31 | 2.54 | 2.11 | 1.89 |
| *(Azari)* | Sd | 0.34 | 0.82 | 0.57 | 0.88 | 1 |
| | N | 45 | 45 | 45 | 45 | 45 |
| *Monolingual* | M | 2.84 | 2.33 | 2.51 | 2.17 | 2.02 |
| *(Farsi)* | Sd | 0.36 | 0.79 | 0.72 | 0.83 | 1 |
| | N | 45 | 45 | 45 | 45 | 45 |

**Table 4: Chi-Square Test on Bilinguals and Monolinguals on Cognitive Tasks.**

| | Quantity | Weight | Seriation | Classification | Spatial |
|---|---|---|---|---|---|
| X | 0.338 | 0.278 | 3.128 | 3 | 0.776 |
| Df | 2 | 4 | 4 | 4 | 2 |
| Sig | 0.844 | 0.991 | 0.537 | 0.558 | 0.579 |

P>0.05

As shown in Table 4, there are no significant differences between bilinguals and monolinguals groups on conservation tasks of Piaget.

**Table 5: Anova Analysis for Age, Language, and Interaction Between Age and Language**

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| age | 819.244 | 2 | 409.622 | 168.155* | 0.000 |
| language | 4.133 | 2 | 2.067 | 0.848 | 0.431 |
| Age*language | 8.88 | 4 | 2.222 | 0.009 | 1.000 |
| residual | 306.933 | 126 | 2.436 | | |

P<0.01: the main effect of age is significant

## 4. DISCUSSION

The major results are concerned with the equivalence of all groups (bilingual and monolingual groups) on the conservation tasks. The results are in support of Tonezakis (1975), Keats (1977) and Saito-Horgan (1995) studies. Our findings supported Saito-Horgan's study which found no difference between bilingual and monolingual children on Piagetian tasks. It does not mean that bilingualism is unrelated to cognitive development. As Saito-Horgan noted all of the children came from subtractive bilingual programs, as our children, which may have mitigated and potentially positive impact the children's bilingualism might have had on cognitive development.

It should be considered that children of this study didn't receive any education in their native languages; the majority of the students were members of an ethnic or linguistic minority, whereas the school was dominated by the mainstream language and culture.

One of the characteristics of the current study is that the children were from similar socio-economic backgrounds. In fact, bilinguals and monolinguals were matched on all characteristics (from middle-class socio-economic status). Diaz (1985) also found that the degree of bilingualism is confounded with socio-economic status in bilingual populations in United States.

As Meschyan & Hernandez (2002) stated, there is a clear transfer of decoding ability from participation's native language to their second language. So, in educational systems, there should be consideration of children's native languages. As our research showed, there is no significant difference between the bilingual and monolingual children in achieving Piaget's cognitive tasks. As Latham (1995) mentioned, we should note that whether the bilingualism is additive or subtractive. In this research, bilingualism is subtractive one, because the children's mother language has no place in the educational system.

## 5. CONCLUSION

The experience of becoming bilingual in a subtractive context is common for young children in Iranian educational institutions. According to Makin, Campbell & Diaz (1995), in some situations, mother languages are gradually replaced by second or dominate languages. In our society, the dominant language in schools is Farsi. Although many minority bilingual children are successful in learning Farsi at school, their bilingualism is often limited because their first (home) language is not supported in the mainstream educational settings. As Cummins (1991) mentioned, children must attain a critical level of proficiency in their native language in order to avoid cognitive deficits associated with bilingualism, and that a critical level of proficiency in L2 must be reached if advantages in cognitive functioning are to develop. As Bialystok (2001) noted, children need a great amount of support from their communities, their families, and above all, support from their school, particularly when they are socio-economically disadvantaged.

Lee (1996) also believed that in examining how bilingualism might affect cognitive development, one must consider communities, schools, families, and society in general, view bilingualism as a desirable and valuable condition, or rather as unnecessary and of little value and important. In present study although subjects come from equal socio-economic backgrounds, but their ethic languages are not supported in formal written communication or in formal schooling. Farsi is the only language used at instructional levels and at the formal situation. There would be no opportunity for children's home

language to be drawn upon in formal schooling. There may, however, be some pedagogical implications of the current study in terms of learning second and third language which are taught (such as Arabic and English) at school. School bilingual children who are proficient in their formal language (Farsi) may well be advantageous in learning Arabic and English in school settings.

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## GENİŞLETİLMİŞ ÖZET

Bir olgu olarak iki dillilik, iki farklı dilde iletişim kurabilme becerisine sahip olma durumu anlamına gelmektedir. İnsanlar, doğdukları andan itibaren iki farklı dilin konuşulduğu ortamlarda büyürlerse her iki dili de doğal bir şekilde edinebilmekte ve bu süreç sonunda da her iki dilde de yetkin olabilmektedirler. Buna ek olarak, ikiden çok dili konuşabilen ailelerin ve sosyal çevrenin etkisiyle de bu dillerin hemen tümü öğrenilebilmekte ve bu gibi durumda bulunan lişilere çok dilli birey tanımlaması yapılmaktadır. Aile ve sosyal ortamlarda yalnızca tek bir dil kullanılıyor ise, yalnızca bu dilin konuşulduğu ortamlarda büyüyen çocuklar, yine yalnızca bu dilde iletişim kurabilme becerisini kazanırlar ve diğer dillerde formel eğitim alana kadar ya da diğer bir dili sosyal olarak iletişim sürecinde öğrenebilene kadar tek dilli bir birey olarak yaşamaya devam eder.

İran'ın özellikle batı ve kuzey batısında halkın konuştuğu gündelik diller arasında Azerice, Kürtçe ve resmi dil olarak da kullanılmakta olan Farsça bulunmaktadır. Binlerce öğrenci evlerinde anadil olarak bu dilleri konuşmakta ve eğitim-öğretim ortamlarında kullanılan dil Farsça olmakla birlikte sınıf ve okul ortamında diğer dillerin kullanıldığı da görülmektedir. Kısaca, iki dilli öğrencilerin bir

arada öğrenim gördüğü İran okullarında iki dillilik alışagelmiş bir olgu olmakla birlikte resmi olarak tanınmamış ve bu konuda yapılan çalışmalar da sınırlı sayıda kalmıştır.

Bu çalışmanın amacı, iki dillilik alan yazınına katkıda bulunmak amacıyla, iki dilliliğin bilişsel gelişim üzerine olan etkilerini incelemektir. Çalışma halen Urumiye şehrinde yaşamakta olan toplam 135 ilköğretim 1, 3 ve 5. sınıf öğrencisini kapsamaktadır. Öğrencilerin birinci dilleri Azerice ve Kürtçe ve okullarında öğrenim gördükleri dil de Farsçadır. Çalışmanın verileri Piaget'nin yöntemlerine dayanarak hazırlanmış yazılı sınavlardanelde edilmiştir. Çalışmanın en temel bulgusu hipotezimizi doğrular nitelikte olup yaşın bilişsel düzeyle ilgili olduğudur. Diğer bir bulgu da, Piaget ilkelerine göre tasarlanmış etkinliklerde iki ve tek dilli bireyler arasında önemli bir fark olmadığıdır.

Araştırmanın örneklemini 45 Kürtçe anadilli, 45 Azeri anadilli ve 45 Farsça anadilli çocuk oluşturmaktadır. Farsça anadilli çocuklar tekdilli diğerleri ise iki dilli çocuklardır. Çocukların tümü de orta sınıf ailelerden gelmektedir. Ölçümlerde Piaget'nin klinik görüşme yöntemi uygulanmıştır. Çocuklar teker teker ve bireysel olarak sınanmıştır ve bu süreç okul içinde geçmiştir. Sınama sırasıyla miktar, ağırlık, sıralama, sınıflama ve uzam algılamadan oluşmaktadır ve her test yaklaşık 15 dakika sürmüş ve her öğrencinin kendi anadilinde yapılmıştır. Araştırmanın ilk sorusu olan yaş ile bilişsel görev arasında bir ilişki olup olmadığı farkların Ki-karelerinin incelenmesi yoluyla yanıtlanmıştır. Sonuçlara göre yaş artışı bilişsel gelişimin öngörülmesinde yararlı olmaktadır çünkü yaş ilerledikçe çocuklar bilişsel görevleri daha başarılı bir şekilde edinmektedirler. Araştırmanın ikinci sorusu bilişsel görevlerde tek ve iki dilli çocuklar arasında fark olup olmadığıdır ki Farsçanın yanısıra Kürtçe ve Azerice konuşan çocukların performanslarının yalnızca Farsça konuşan çocuklardan daha başarılı olduğu sonucunu ortaya koymuştur.

Sonuçlar göstermiştir ki miktar sınamasında tekdillilerin ve çokdillilerin performansları aynıdır. Sınıflandırma, uzam algılama testlerinde çokdilliler tekdillilerden daha iiy performans göstermişlerdir.Buna ek olarak, sıralama görevinde, Azeri tekdilli çocuklar diğer gruplara gore daha iyi performans göstermişlerdir. Sonuç olarak, Piaget'in görevlerinde tekdilliler ve çokdilliler arasında farklılıklar vardır fakat bu farklar kayda değer değildir. Df 2,4 seviyesi ile X değerleri 5,99, 9.49. P> 0.01, P>0.05'tir. Sonuçların da gösterdiği gibi, tekdillilerin ve çokdillilerin Piaget'in bilişsel görevlerini tamamlamada kayda değer bir farklılığı yoktur. Bu çalışmaya katılan çocukların anadilleri ile ilgili herhangi bir eğitim almadıkları belirtilmelidir; öğrencilerin çoğunluğu bir etnik ya da dilsel azınlığa tabidirler, öte yandan okul örgün eğitim dili ve kültürüyle yönetilmektedir.

Bu çalışmanın sonuçları Saito-Horgan'ın (1995) Amerika'daki Latin kökenli İngiliz öğrenciler üzerinde yaptıkları çalışmanın sonuçları ile de desteklenmektedir. Buna karşın şimdiki çalışma ile Saito-Horgan'ın çalışmasına katılan katılımcılar arasında bazı farklılıklar vardır. Horgan'ın çalışması denekler Amerika'daki düşük sosyo-ekonomik statüye sahip Meksikalı göçmenler üzerine yapılmıştır. Latham'ın da (1995) bahsettiği gibi, tekdilliğin arttırıcı ya da eksiltici olabileceğini belirtmek gerekmektedir. Bu çalışma kapsamındaki tekdillilik eksiltici olandır çünkü çalışmaya katılan çocukların anadilleri eğitim sisteminde yer almamaktadır. Latham tekdilliliğin çacuğa zihin çevikliği sağladığına inansa da, İran eğitim kurumlarında çacukların çokdilliliğe geçiş süreci genellikle eksiltici niteliktedir. Makin, Campell ve Diaz'a gore (1995), bazı durumlarda ikinci dil ya da etkin olan dil kademeli olarak anadillerin yerini almaktadır. Bizim toplumumuzda, okullarda etkin olan dil Farsça'dır ve pekçok iki dilli azınlık altyapısından gelen çocuk Farsça'yı öğrenmede başarılı olsa da, bu çocukların anadilleri eğitim kurumlarında desteklenmediği için iki dillilik süreçleri sınırlı kalmaktadır. Bialystok'un (2001) da belirttiği gibi, çocuklar, özellikle sosyo-ekonomik yönden zayıf olanlar, kendi toplumlarından, ailelerinden ve özellikle eğitim gördükleri okullarından büyük ölçüde desteğe ihtiyaçları vardır. Lee de (1996) iki dilliliğin insan zekası üzerinde ne tür bir etki gösterdiğini araştırırken toplumları, okul, aile ya da genel olarak toplum'un, iki dilliği istenenr ve değer verilen bir durum mu yoksa gereksiz ve değersiz mi gördükleri dikkate alınmalıdır. Bu çalışmaya katılmış bulunan öğrenciler eşit sosyo-ekonomik altyapıdan gelseler de onların etnik dilleri resmi yazışma dilinde ve resmi olarak uygulanmakta olan eğitim sisteminde yer almamaktadır. Farsça resmi dil olarak bütün eğitim kurumlarında kullanılan dildir. Bu durumda öğrencilerin anadillerinin resmi eğitim kurumlarında kullanılması imkansızdır. Bu çalışmanın sonuçları tanımlanan dil öğretim politikasına ışık tutacak niteliktedir.