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Balasaheb Desai College, Patan

DEPARTMENT OF STATISTICS

Project Report on

"Statistical Analysis of Birth Order of Child and Their Performance"

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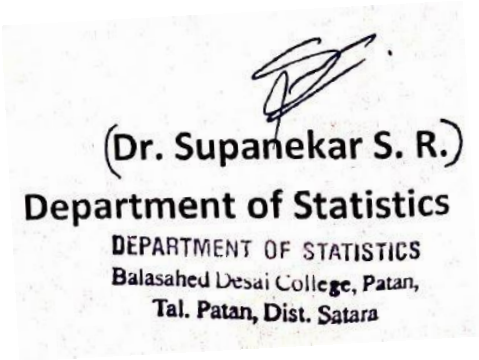

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INTORDUCTION

Birth order refers to the order in which children are born into a family, typically categorized as oldest, middle, youngest, or only child. The concept of birth order has long been a topic of interest in psychology, sociology, and other social sciences due to its potential impact on various aspects of personality, behavior, and development. One aspect often explored in this context is the relationship between birth order and cleverness or intelligence.

Research on birth order and cleverness has produced mixed findings over the years. Some studies have suggested that birth order may influence intelligence, with firstborn children often believed to have higher levels of intelligence or academic achievement compared to their younger siblings. This notion is often attributed to factors such as increased parental attention and resources available to the firstborn, as well as the role of the firstborn as a mentor or teacher to younger siblings, which may enhance cognitive development. However, other studies have failed to find consistent evidence supporting a significant relationship between birth order and intelligence. Some researcher said that younger children often higher levels of intelligence or academic achievement compared to their firstborn. Hence we interested to study this topic.

It's essential to approach the topic of birth order and cleverness with caution, as individual differences among siblings can be vast and influenced by numerous factors beyond birth order alone. While birth order may play a role in shaping certain aspects of personality and behavior, its impact on intelligence is still a topic of ongoing debate and research in the field of psychology.

METHODOLOGY

In this Project, we select such families where child's has passed S.S.C exams from different villages of Patan Taluka. We collect data from 189 families with 396 children on the basis of questionnaire attached in Appendix 1

OBJECTIVE

To study the relation between,

1) Birth order and cleverness of child
2) Birth order and understanding of child

ANALYSIS OF DATA

Collected data are classified and analyzed and presented in tabulated form. The different tables are given here,

Order	Cleverness Level			Total
	Most Clever	More clever	clever	
Firstborn	85	99	3	187
Second born	100	87	4	191
Third born	5	4	9	18
Total	190	190	16	396

Order	Understanding Level			Total
	1	2	3	
Firstborn	107	78	3	188
Second born	78	106	6	190
Third born	3	5	9	18
Total	188	189	19	396

TESTING PROCEDURE

Notations:

Oi (i=1,2,…….n) be the set of observed (experimental)frequencies

Ei (i=1 ,2,…n) be the corresponding set of expected (therotical) frequencies.

I) Test for independence of birth order and cleverness of child

Step 1: Null Hypothesis

H_0: Birth order and cleverness is independent.

Step 2: Alternative Hypothesis

H_1: Birth order and cleverness are not independent

Step 3: Let the level of significance for this test is α=0.05

Step 4: Computation

Oij	Eij	(Oij-Eij)^2/Eij	
85	89.7222	0.248536	
99	89.7222	0.959379	
3	7.5556	2.746769	
100	91.6414	0.762387	
4	7.7172	1.790491	
5	8.6364	1.531125	
13	9.3637	1.412121	
	396.0001	9.685882	

Step 5: Test statistic (under H_0)

$\chi^2 = \sum\sum \frac{(O_{ij}-E_{ij})^2}{E_{ij}}$ =9.6858

Step 6: Critical Region and Decision Rule

$\{\chi^2 / \chi^2 > \chi^2_{(m-1)(n-1)}(\alpha)\}$ i.e. $\{\chi^2 / \chi^2 > \chi^2_4(0.05)\}$ i.e.$\{\chi^2 / \chi^2 > 9.488\}$

here, χ^2= 9.6858 is belongs to critical region

Therefore we Reject Ho.

i.e. Birth order and cleverness are not independent

II) Test for independence of birth order and understanding of child

Step 1: Null Hypothesis

H_0: Birth order and understanding is independent.

Step 2: Alternative Hypothesis

H_1: Birth order and understanding are not independent

Step 3: Let the level of significance for this test is $\alpha=0.05$

Step 4: Computation

Oij	Eij	(Oij-Eij)^2/Eij	
107	89.2525	3.5290	
78	89.7273	1.5328	
3	9.0202	4.0180	
78	90.2020	1.6506	
106	90.6818	2.5876	
6	9.1162	1.0652	
3	8.5455	3.5987	
15	9.4545	3.2526	
		21.2345	

Step 5 : Test statistic (under H0)

$$\chi^2 = \sum\sum \frac{(O_{ij}-E_{ij})^2}{E_{ij}} = 21.2345$$

Step 6: Critical Region and Decision Rule

$\{\chi^2 / \chi^2 > \chi^2_{(m-1)(n-1)}(\alpha)\}$ i.e. $\{\chi^2 / \chi^2 > \chi^2_4(0.05)\}$

i.e. . $\{\chi^2 / \chi^2 > 9.488\}$

here, $\chi^2 = 21.2345$ is in critical region

Therefore we Reject Ho.

i.e. Birth order and understanding are not independent

V) Test for equality of proportion of Birth order in Cleverness

Step 1: Null Hypothesis: H_0: P1 = P2

Step 2: Alternative Hypothesis: H_1: P1 < P2

Step 3: Let the level of significance for this test is α=0.05

Step 4: Computation:

Sample Proportion of cleverness among older child. = P1= 0.4594

Sample Proportion of cleverness among younger child. = P2=0.5405

Step 5: Test statistic (under H_0)

U = P1- P2/√(1/n1+1/n2)*p^Q^~N(0,1)

Therefore, U= -3.1316

Step 6: Critical Region and Decision Rule

{U / U < -uα},Here , -uα = -u(0.05) = -1.64

{U / U < -1.64 Therefore, U belongs to critical region.

Hence we reject H0.

Therefore we conclude that, "Younger child is more clever than older one."

VI) Test for equality of proportion of Birth order in understanding

Step 1: Null Hypothesis: H_0:$P_1 = P_2$

Step 2: Alternative Hypothesis: H_1: $P_1 > P_2$

Step 3: Let the level of significance for this test is α=0.05

Step 4: Computation

Sample Proportion of understanding among older child. = P_1= 0.5783

Sample Proportion of understanding among younger child. = P_2=0.4216

Step 5: Test statistic (under H_0)

U = P1- P2/√(1/n1+1/n2)*p^Q^~N(0,1)

Therefore, U= 6.05019

Step 6: Critical Region and Decision Rule

{U / U > uα}, Here, uα =u(0.05) = 1.64

{U / U >1.64} Therefore, U belongs to critical region.

Hence we accept H0.

Therefore we conclude that, "Understanding level of older child is more than Younger"

Conclusions:

Hence we conclude that,

1) Cleverness is dependent on birth order.
2) Understanding is dependent on birth order.
3) Younger child is more clever than older child.
4) Understanding level of older child is more than younger child.