

McNemar's Test in SPSS

Notes

- 1. The author accepts no responsibility for the topicality, correctness, completeness, or quality of the information provided.
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What exactly is McNemar's test?

		Measure at Time 2	
		Outcome 1	Outcome 2
Measure at Time 1	Outcome 1	a	b
	Outcome 2	c	d

Is there **a change in proportion** for the paired data (i.e., paired data: Time 1 and Time 2)?

Hypothesis for McNemar's Test

		Time 2		
		Outcome 1	Outcome 2	
Time 1	Outcome 1	a	b	a + b
	Outcome 2	c	d	c + d
		a + c	b + d	

H0: The marginal probabilities for two outcomes are the same.

Ha: The marginal probabilities for two outcomes are not the same.

$$H0: p_a + p_b = p_a + p_c$$

$$Ha: p_a + p_b \neq p_a + p_c$$



$$H0: p_b = p_c$$

$$Ha: p_b \neq p_c$$

Test Statistic for McNemar's Test

		Time 2		
		Outcome 1	Outcome 2	
Time 1	Outcome 1	a	b	a + b
	Outcome 2	c	d	c + d
		a + c	b + d	

$$H_0: p_b = p_c$$

$$H_a: p_b \neq p_c$$

$$\chi^2 = \frac{(b - c)^2}{b + c}$$

$$\chi^2 = \frac{(b - c - 1)^2}{b + c}$$

McNemar's Test Data Example

		After Ad		
		Not Buy	Buy	
Before Ad	Not Buy	28	22	50
	Buy	6	44	50
		34	66	

$$\chi^2 = \frac{(b - c)^2}{b + c}$$

$$\chi^2 = \frac{(22 - 6 - 1)^2}{22 + 6} = 8.036$$

$$\text{Critical Value: } \chi(1)^2 = 3.841$$

$$df = 1$$

McNemar's Test – Report Finding

We conducted a McNemar test and obtained the following results: $\chi^2 = 8.036$, p-value = 0.005. Thus, we reject the null hypothesis, suggesting that the ratios of purchasing and not purchasing the product significantly differ between before and after the advertising.

		After Ad		
		Not Buy	Buy	
Before Ad	Not Buy	28	22	50
	Buy	6	44	50
		34	66	

Next...

1. Steps of McNemar's Test in SPSS

2. Difference between McNemar's Test
vs. Chi-square Independence Test

Difference between McNemar's Test vs. Chi-square Independence Test

McNemar's Test vs. Chi-square Independence Test

McNemar's Test

		After Ad	
Before Ad		Not Buy	Buy
	Not Buy	28	22
	Buy	6	44
		34	66

Chi-square Independence Test

		Purchase	
Gender		Not Buying	Buying
	Man	28	22
	Woman	6	44
		34	66
			100

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McNemar's Test vs. Chi-square Independence Test

Chi-square Independence Test

		Purchase		
		Not Buying	Buying	
Gender	Man	28	22	50
	Woman	6	44	50
		34	66	100

- H_0 : There is no association between gender and the purchase of the product.
- H_a : There is an association between gender and the purchase of the product.

$$\chi^2 = \sum \frac{(O-E)^2}{E} = \frac{(28-17)^2}{17} + \frac{(22-33)^2}{33} + \frac{(6-17)^2}{17} + \frac{(44-33)^2}{33} = 21.57$$