

McNemar's Test

Verified Python analysis transcript

Test: McNemar's Test

Design: Paired binary change from G2 pass/fail to G3 pass/fail.

Variables: G2 ≥ 10 , G3 ≥ 10

Null hypothesis: The two discordant transition probabilities are equal.

Primary formula: Exact p uses Binomial(b+c, 0.5); corrected $X^2 = (|b-c|-1)^2/(b+c)$

Valid source rows: 649

Verified results:

exact_statistic: 11.0

exact_p_value: 2.1457960315833694e-08

corrected_chi_square: 28.895522388059703

corrected_p_value: 7.63892954270268e-08

b_fail_to_pass: 56

c_pass_to_fail: 11

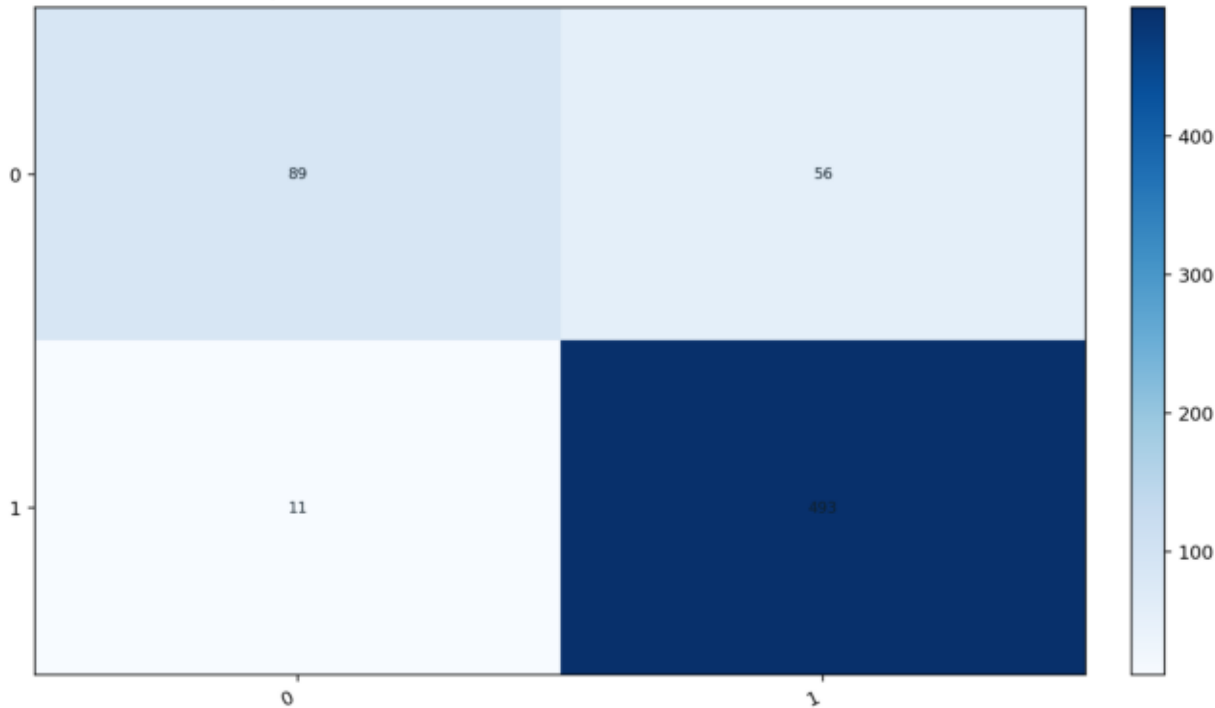
Interpretation:

Exact McNemar p = 2.1458e-08; corrected chi-square = 28.895522, p = 7.63893e-08.

The discordant cells are b = 56 and c = 11; concordant cells do not enter the test statistic.

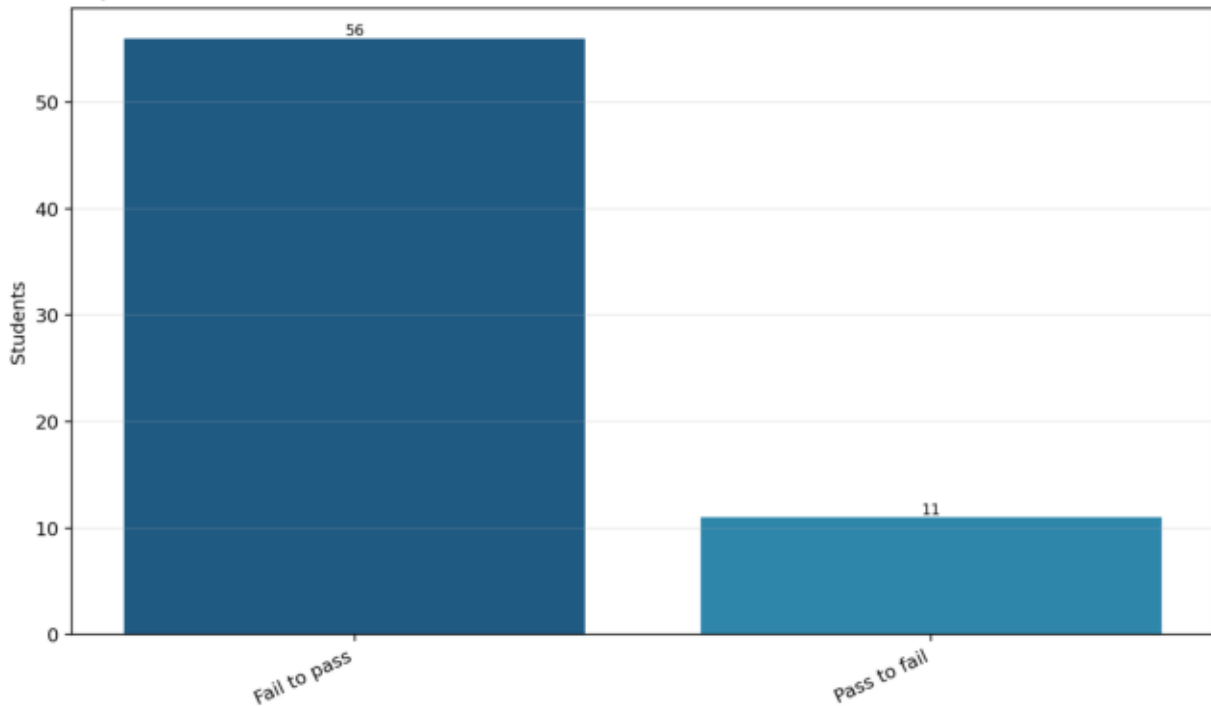
G2 and G3 paired pass table

Concordant and discordant pairs



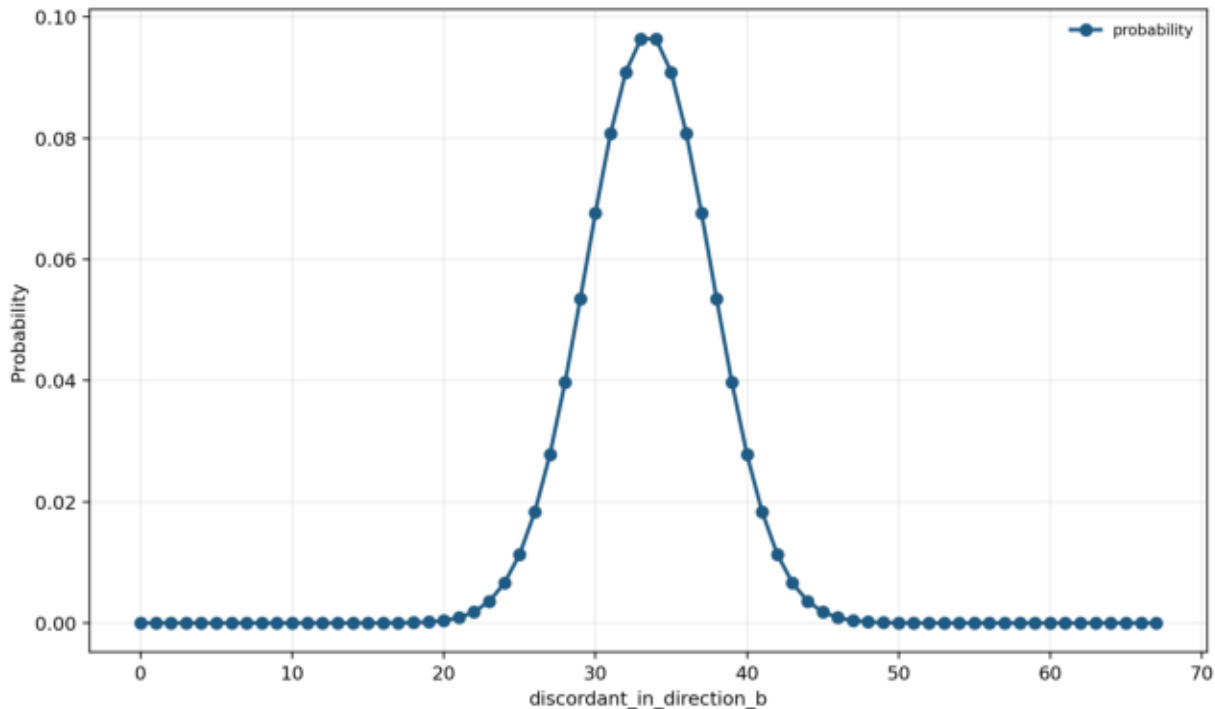
Discordant transition counts

Only these cells enter McNemar's test



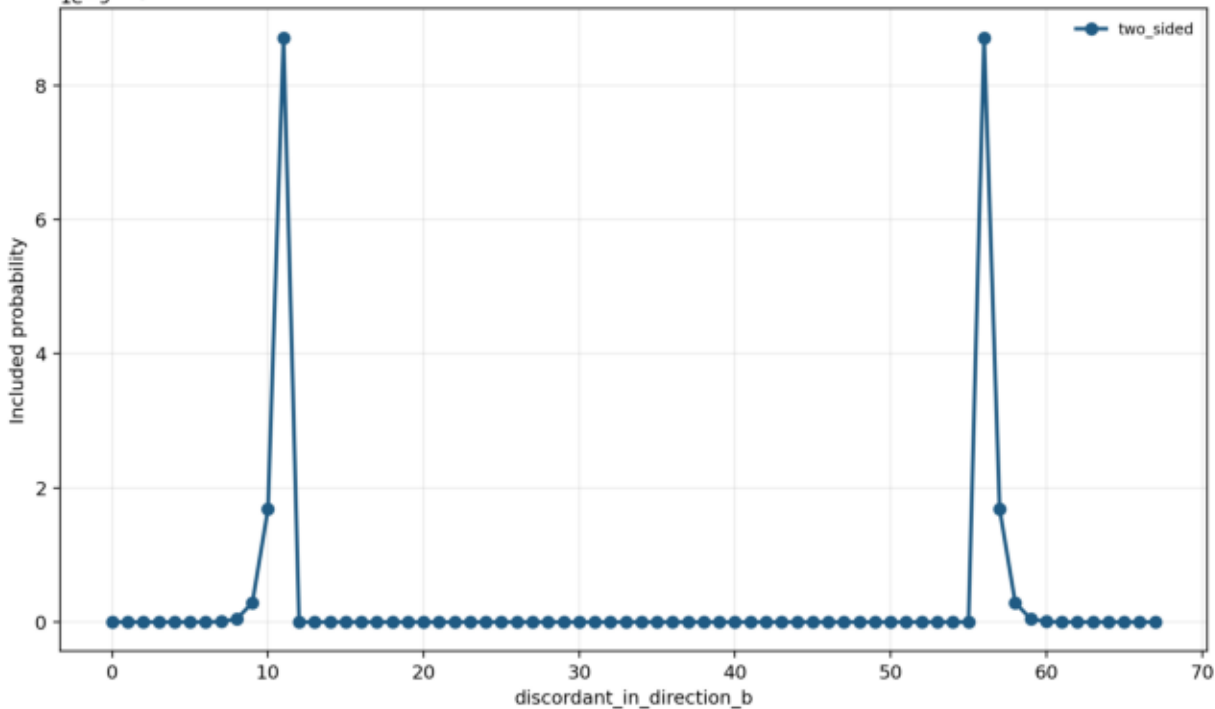
Exact binomial null distribution

Discordant total fixed at $b+c$



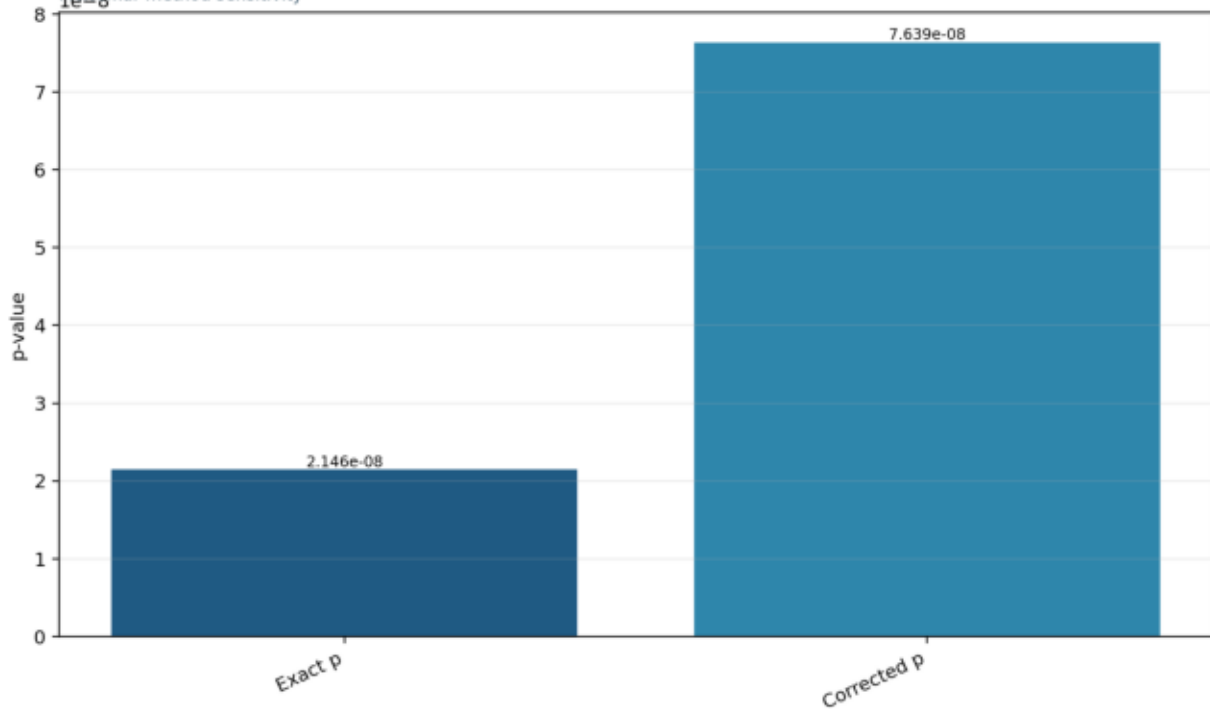
Two-sided exact region

probability-order summation



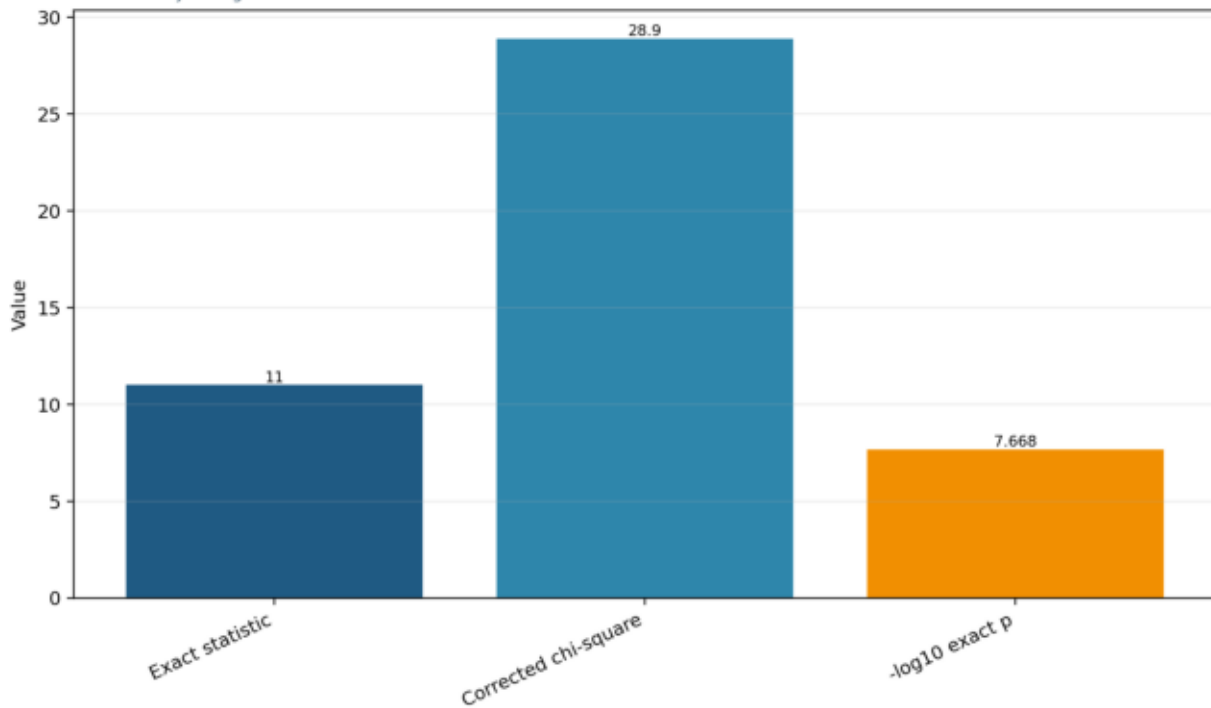
Exact and corrected asymptotic evidence

McNemar method sensitivity



McNemar result

Paired binary change test



Paired Binary Table

0	1
89	56
11	493

Exact Null Distribution

discordant_in_direction_b	probability	included_two_sided
0	6.77626e-21	True
1	4.5401e-19	True
2	1.49823e-17	True
3	3.24617e-16	True
4	5.19387e-15	True
5	6.54428e-14	True
6	6.76242e-13	True
7	5.89297e-12	True
8	4.41972e-11	True
9	2.89737e-10	True
10	1.68048e-09	True
11	8.70793e-09	True
12	4.0637e-08	False
13	1.71926e-07	False
14	6.63142e-07	False
15	2.3431e-06	False
16	7.61508e-06	False
17	2.28452e-05	False
18	6.3459e-05	False
19	0.000163657	False
20	0.000392778	False
21	0.000879074	False
22	0.00183806	False
23	0.00359621	False
24	0.00659306	False
25	0.0113401	False
26	0.0183186	False
27	0.0278171	False