

MANOVA Report =====

Folder: D:/DATA ANALYSIS/E ANOVA Family/MANOVA Input file: D:/DATA ANALYSIS/E ANOVA Family/MANOVA/dataset.csv

Dependent variables: G1, G2, G3 Grouping factor: studytime

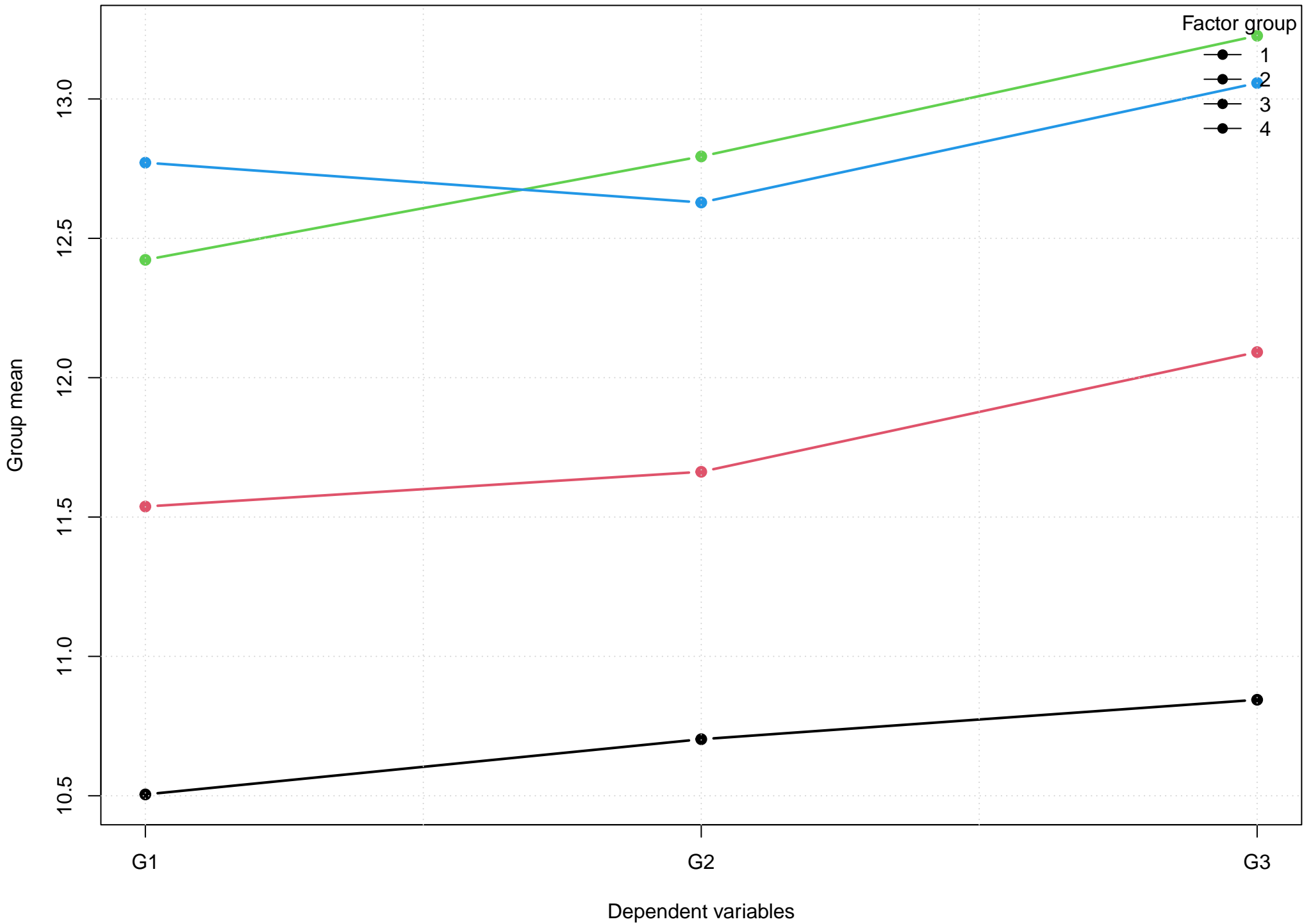
Hypotheses: H0: The multivariate mean vector of G1, G2, G3 is equal across studytime groups. H1: At least one studytime group has a different multivariate mean vector.

Primary MANOVA decision using Pillai's trace: Pillai trace = 3.000000 F = 6.242352 p-value = 0.00000001 Decision = Reject equal multivariate means

Plain-language interpretation: If Pillai's trace p-value is below 0.05, the set of dependent variables differs by group. After a significant MANOVA, inspect the follow-up ANOVA table and charts to see which outcomes explain the difference.

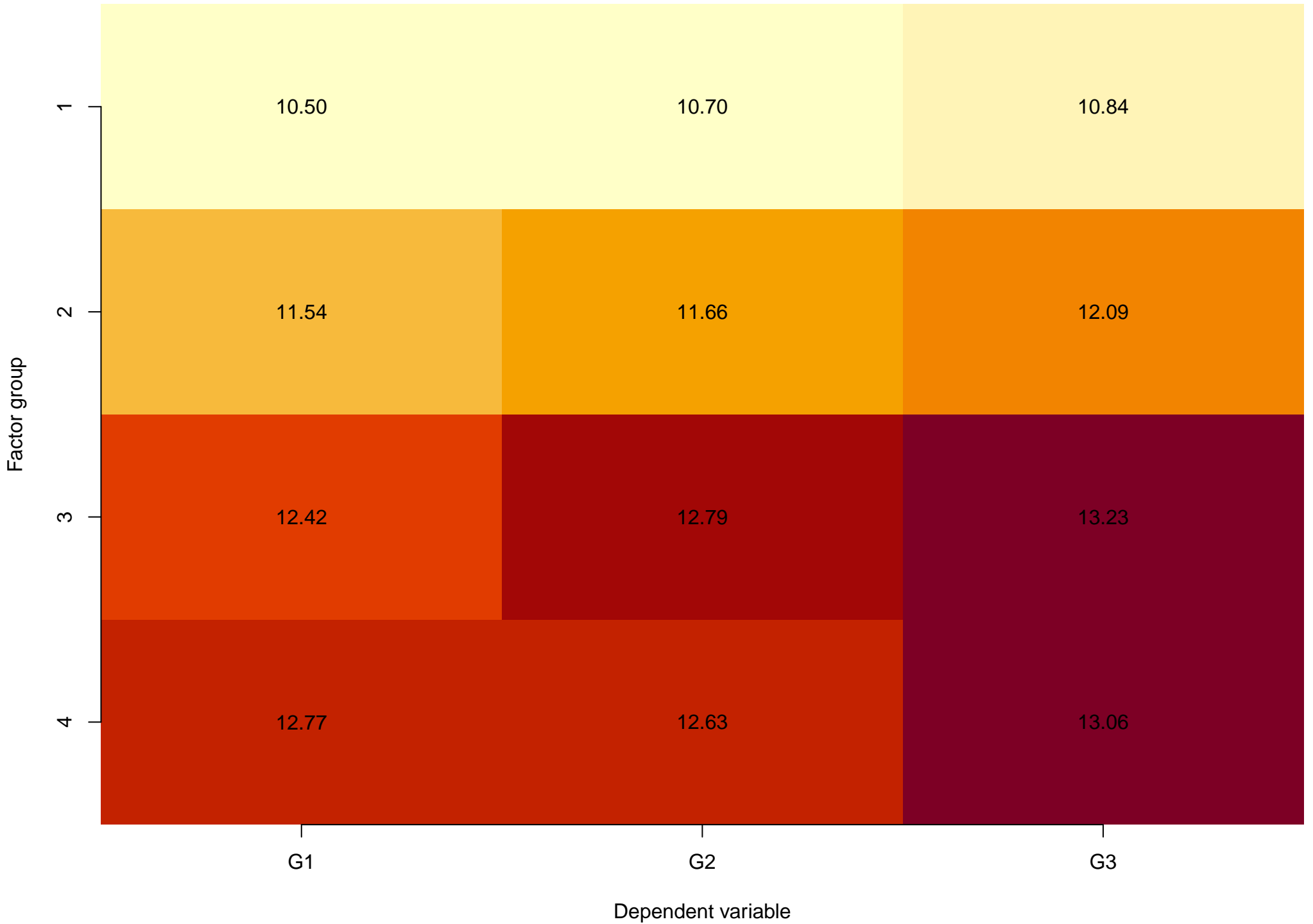
MANOVA: Multivariate Mean Profile by Group

Different line shapes suggest possible multivariate mean differences across groups.



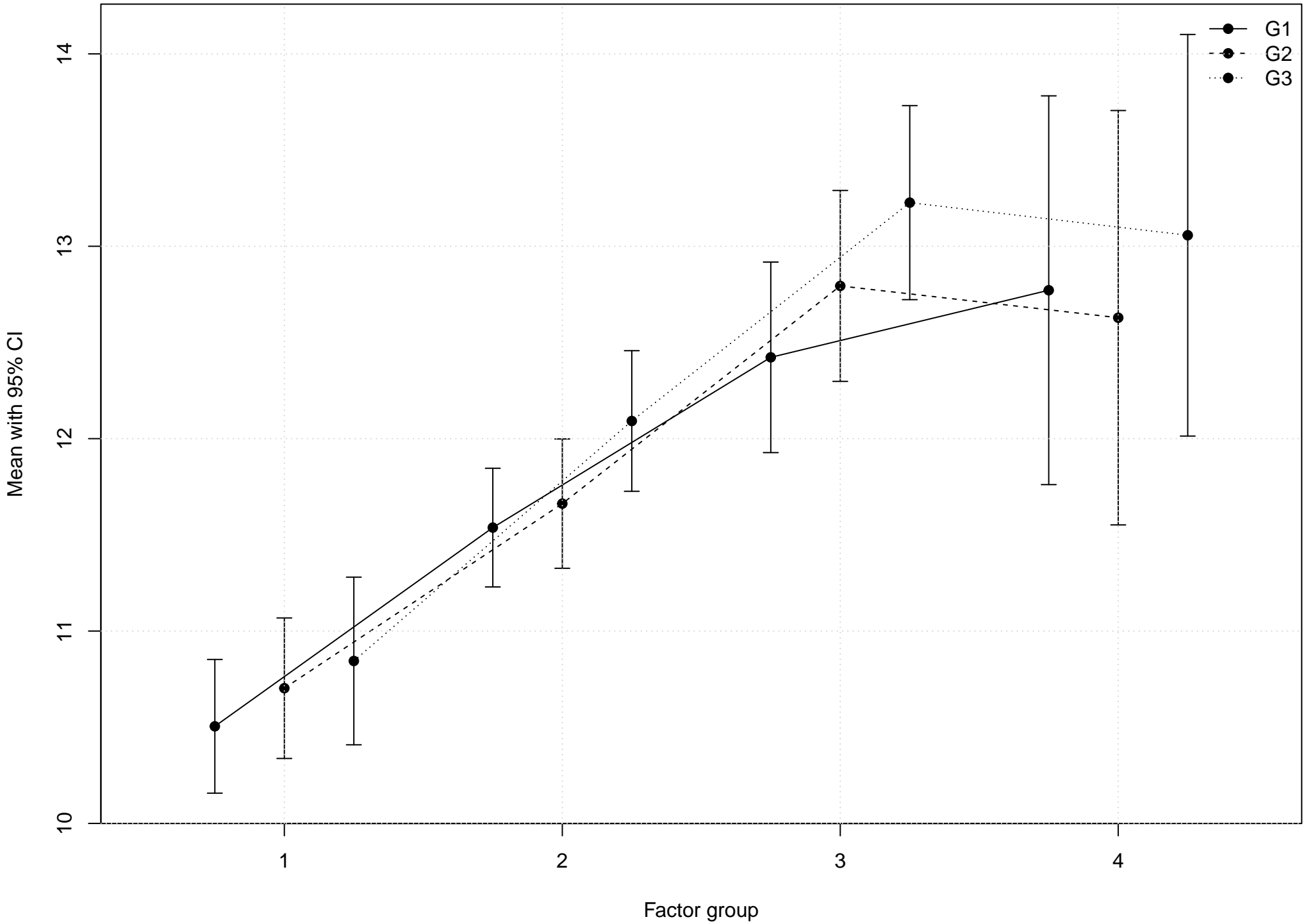
MANOVA: Mean Heatmap

The heatmap compares group means across all dependent variables at once.



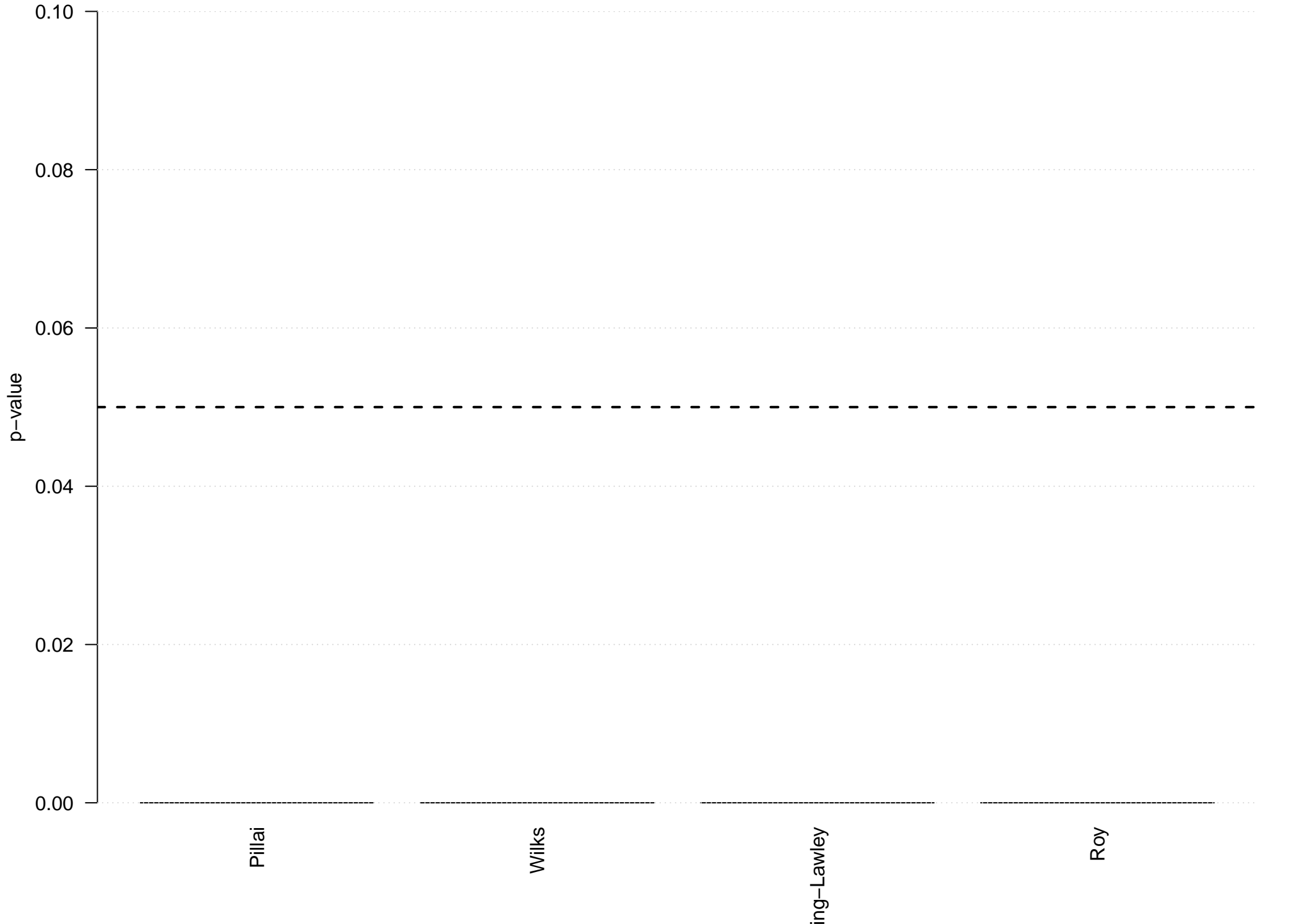
MANOVA: Group Means with 95% Confidence Intervals

Separated intervals across outcomes help explain the multivariate test result.



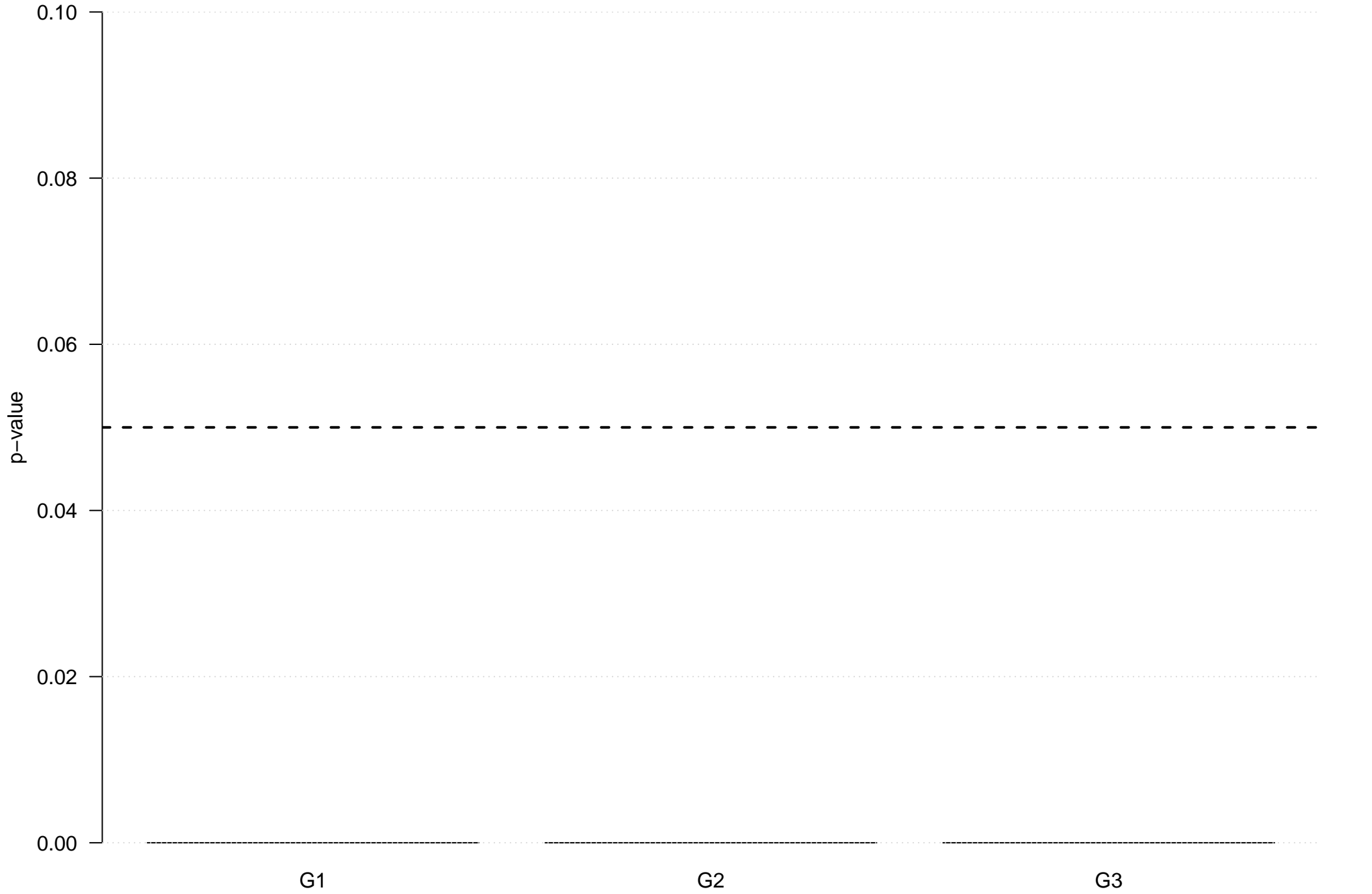
MANOVA: Multivariate Test p-values

Pillai, Wilks, Hotelling–Lawley, and Roy evaluate group separation across outcomes.



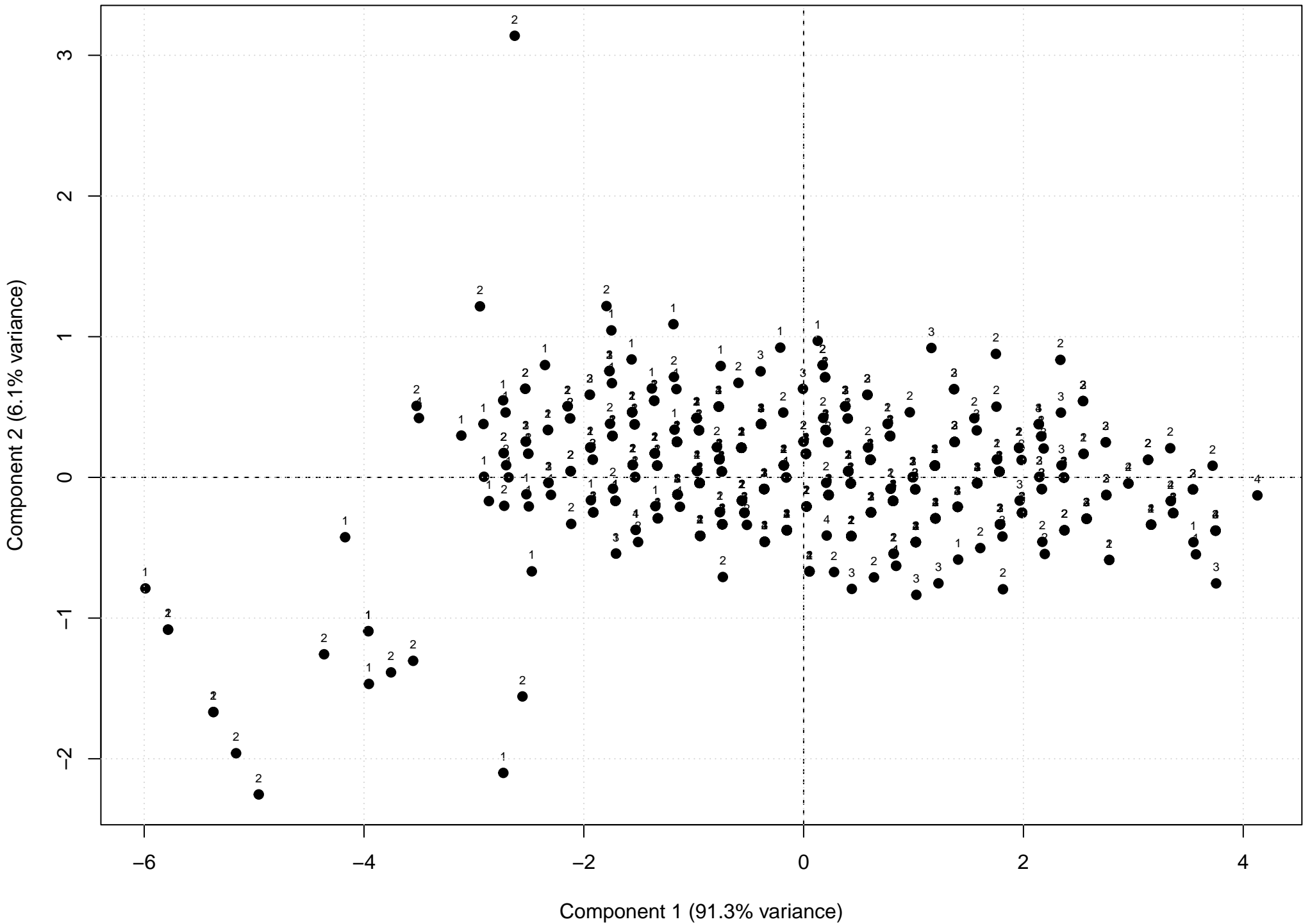
Follow-up Univariate ANOVA p-values

These follow-up tests show which individual outcomes may drive MANOVA differences.



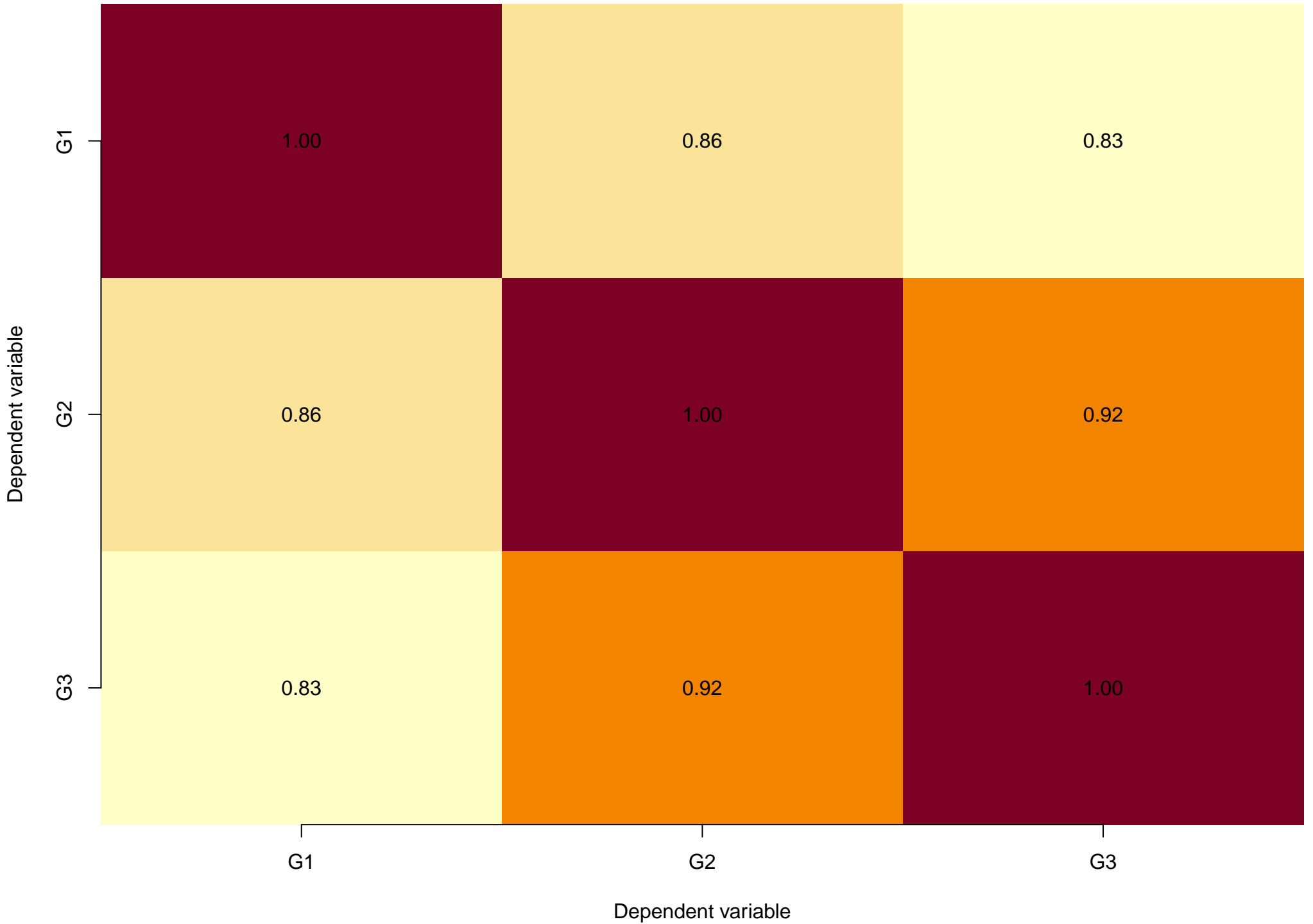
MANOVA: Multivariate Score Scatter

Principal-component scores provide a visual check of group separation across outcomes.



MANOVA: Correlation among Dependent Variables

MANOVA is useful when dependent variables are conceptually related and correlated.



MANOVA Result and Follow-up ANOVA Summary

Pillai trace = 3.0000, F = 6.2424, p = 0.000000

Decision: Reject equal multivariate means

dependent_variable	f_statistic	p_value	eta_squared	decision_alpha_0_05
G1	16.24040	3.467159e-10	0.07023169	Reject equal means
G2	14.45352	4.016781e-09	0.06299107	Reject equal means
G3	15.87627	5.705728e-10	0.06876527	Reject equal means