

Contrast Analysis / Planned Comparisons

Purpose: test specific planned comparisons among group means.
H0 for each contrast: the weighted mean contrast equals zero.
H1 for each contrast: the weighted mean contrast is different from zero.

Summary:

analysis	target_variable	group_variable	number_of_groups	total_n	anova_p_value	anova_decision_alpha_0_05	number_of_planned_contrasts	significant_planned_contrasts_alpha_0_05	important_note
contrast analysis / planned comparisons	G3	studytime	4	649	5.705728e-10	Reject equal group means	4	3	Planned contrasts should be chosen before looking at results; use Bonferroni or other correction if many exploratory contrasts are tested.

ANOVA context:

source	sum_of_squares	df	mean_square	f_value	p_value
Between groups	465.077825	3	155.025942	15.876268	5.705728e-10
Within groups	6298.188739	645	9.764634	NaN	NaN
Total	6763.266564	648	NaN	NaN	NaN

Group summary:

group	n	mean	standard_deviation	variance	standard_error	minimum	maximum	mean_ci95_lower	mean_ci95_upper
1	212	10.844340	3.218624	10.359541	0.221056	0	18	10.411070	11.277609
2	305	12.091803	3.243125	10.517860	0.185701	0	19	11.727830	12.455777
3	97	13.226804	2.502104	6.260524	0.254050	8	18	12.728866	13.724742
4	35	13.057143	3.038410	9.231933	0.513585	6	19	12.050516	14.063769

Contrast results:

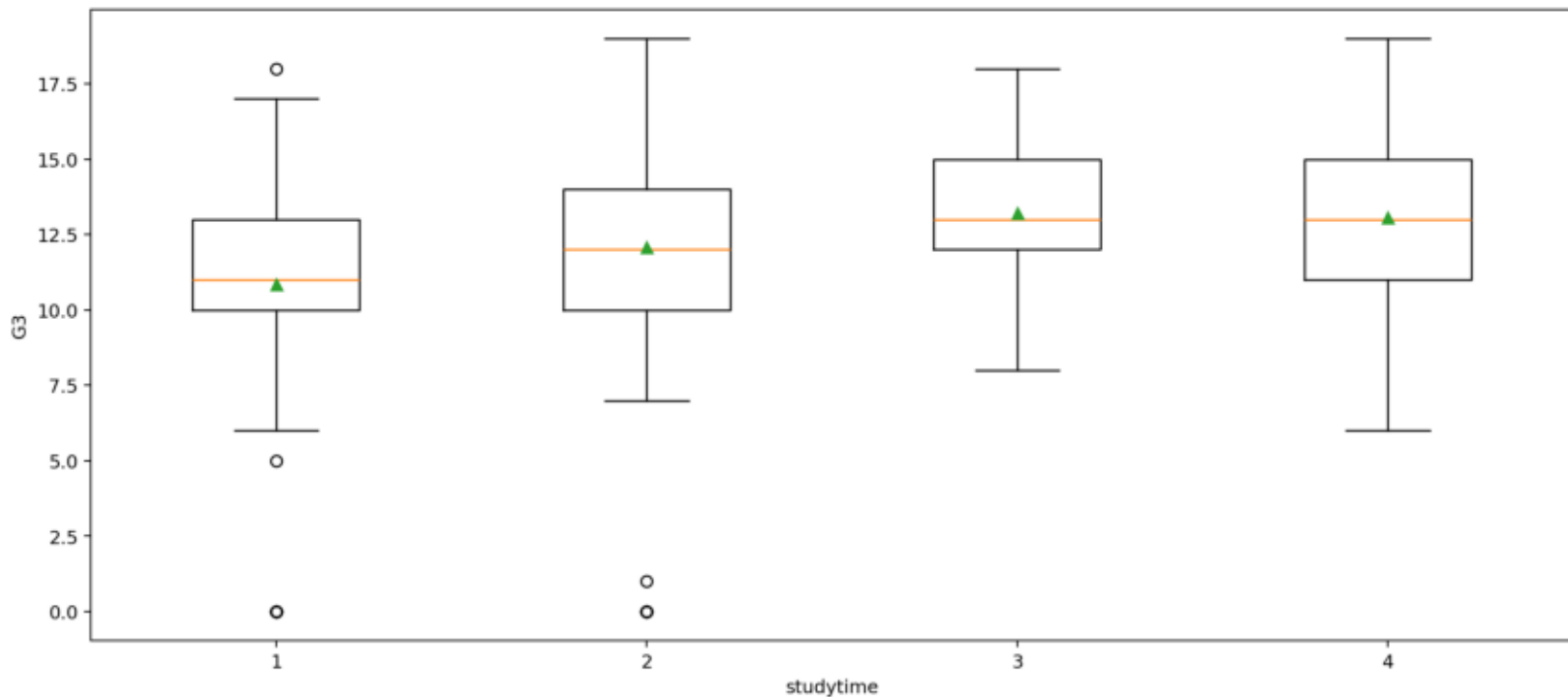
contrast_name	contrast_estimate	standard_error	t_value	df_error	p_value	ci95_lower	ci95_upper	alpha	decision_alpha_0_05	interpretation_note
First group vs all later groups	-5.842731	0.908960	-6.427934	645	2.516362e-10	-7.627609	-4.057854	0.05	Significant planned contrast	Compares the first/lowest factor level against the average pattern of all later levels.
Lower groups vs higher groups	3.347804	0.676558	4.948289	645	9.565401e-07	2.019282	4.676326	0.05	Significant planned contrast	Compares the lower half of groups against the higher half of groups.
Linear trend across ordered groups	7.773411	1.748749	4.445126	645	1.034036e-05	4.339481	11.207340	0.05	Significant planned contrast	Tests whether the dependent variable rises or falls steadily across the ordered factor levels.
Last group vs all earlier groups	3.008482	1.640014	1.834424	645	6.705154e-02	-0.211930	6.228894	0.05	Not significant planned contrast	Compares the last/highest factor level against the average pattern of all earlier levels.

Contrast coefficients:

contrast_name	interpretation_note	coefficient_for_group_1	coefficient_for_group_2	coefficient_for_group_3	coefficient_for_group_4
Linear trend across ordered groups	Tests whether the dependent variable rises or falls steadily across the ordered factor levels.	-3.0	-1.0	1.0	3.0
Lower groups vs higher groups	Compares the lower half of groups against the higher half of groups.	-1.0	-1.0	1.0	1.0
First group vs all later groups	Compares the first/lowest factor level against the average pattern of all later levels.	3.0	-1.0	-1.0	-1.0
Last group vs all earlier groups	Compares the last/highest factor level against the average pattern of all earlier levels.	-1.0	-1.0	-1.0	3.0

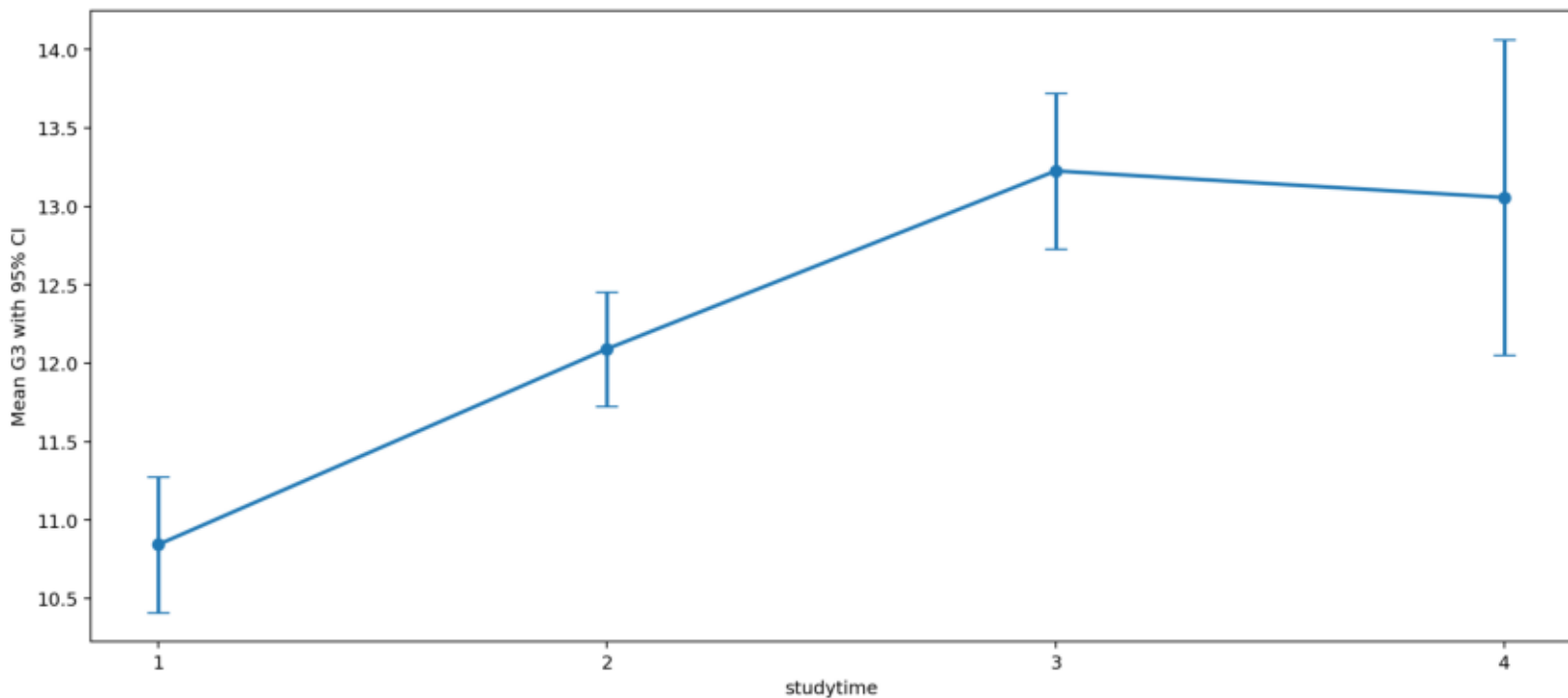
Contrast Analysis: Group Distribution Boxplots

Planned contrasts compare selected patterns among group means.



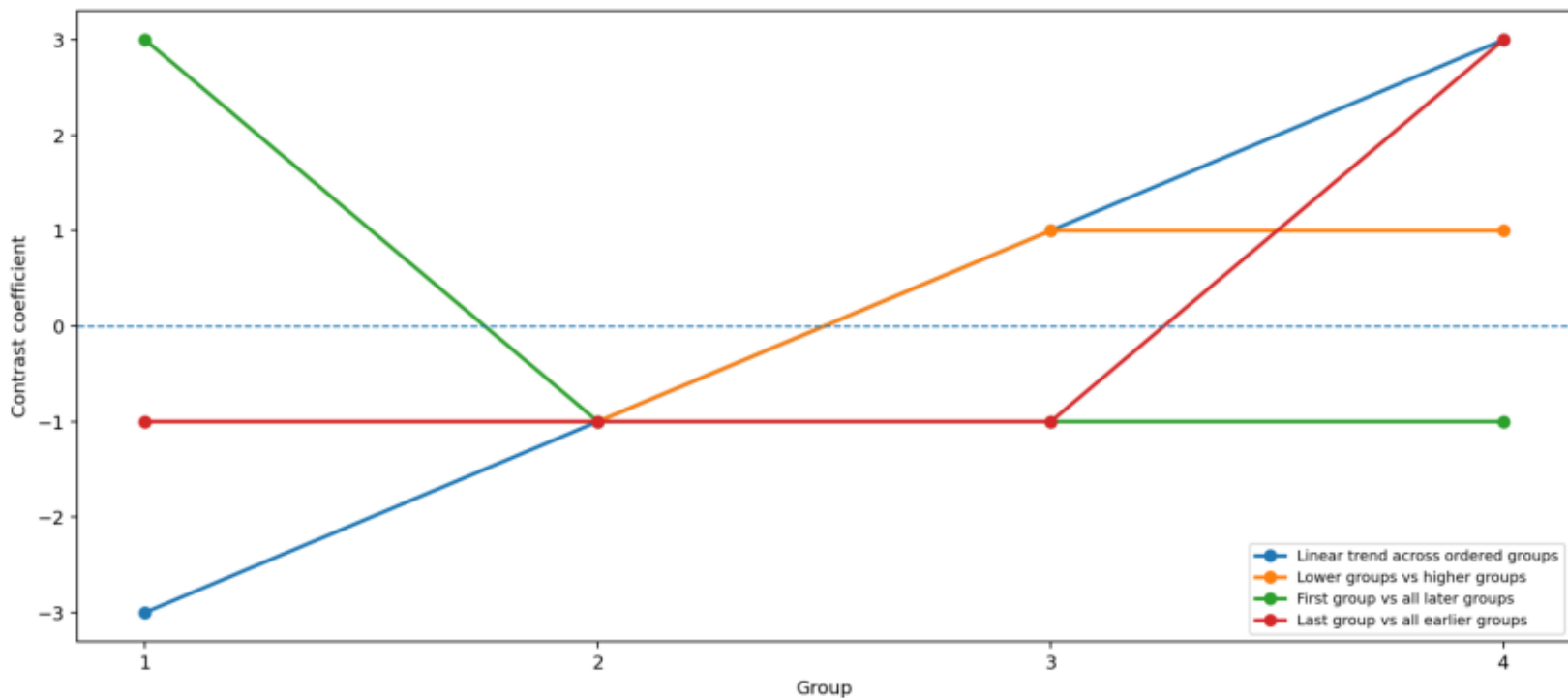
Contrast Analysis: Group Mean Profile

The mean pattern helps interpret linear, low-vs-high, and endpoint contrasts.



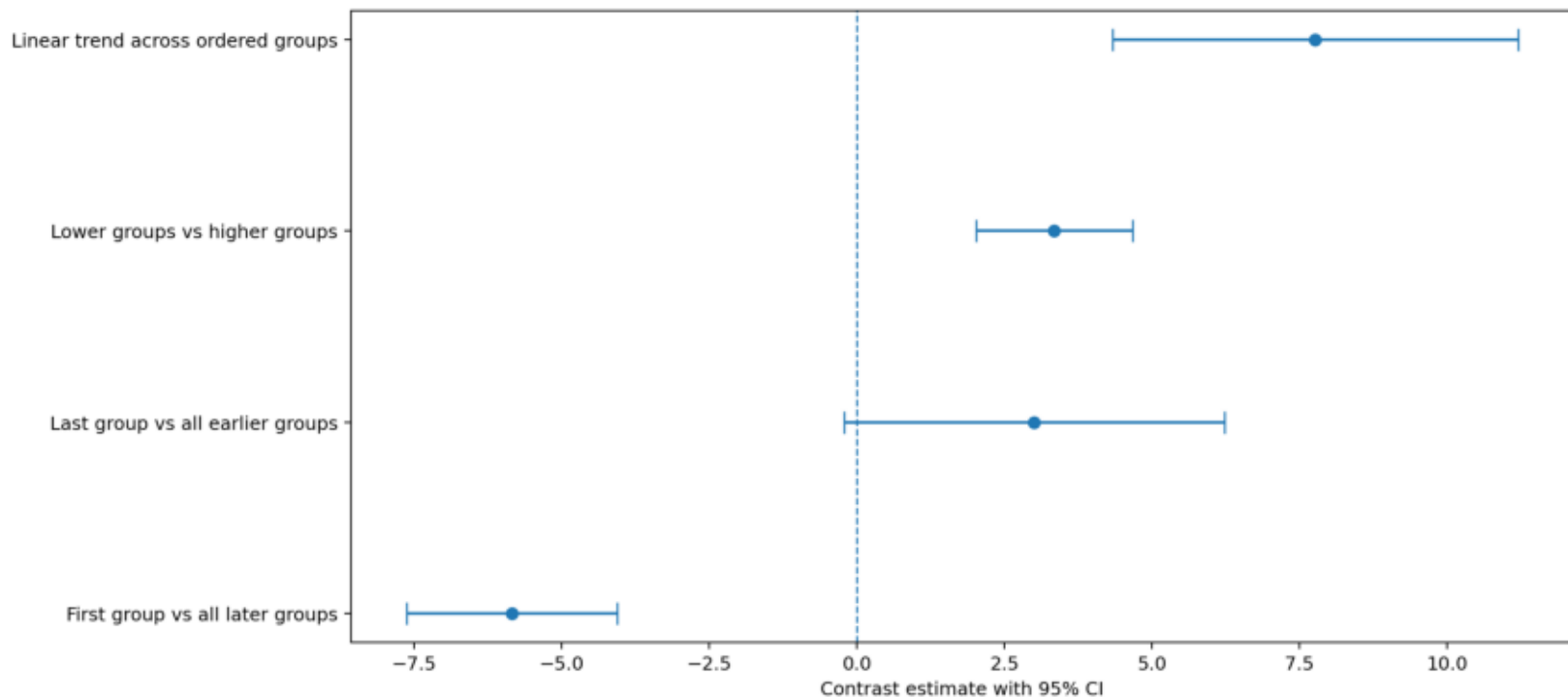
Contrast Analysis: Planned Contrast Coefficients

Positive and negative weights define the exact comparison tested.



Contrast Analysis: Estimates and Confidence Intervals

A confidence interval crossing zero suggests the planned contrast is not statistically significant.



Contrast Analysis: p-value Decision Plot

Contrasts with p-values below 0.05 are significant at the conventional alpha level.

