Student-Newman-Keuls / SNK Post Hoc Analysis

This report is SNK-specific and is not a Ryan-Einot-Gabriel-Welsch copy.
SNK rules used here:
1. Run one-way ANOVA.
2. Order group means from low to high.
3. For every pair, r = number of ordered means spanned by that pair.
4. Keep alpha fixed at 0.05.
5. Compare observed q with q critical for that r and error df.
6. No REGW layer-alpha adjustment is used.

ANOVA result:

target_variable	group_variable	number_of_groups	total_n	grand_mean	ss_between	df_between	ms_between	ss_within_error	df_within_error	ms_within_error	f_statistic	p_value	eta_squared	omega_squared	alpha	anova_decision_alpha_0_05
G3	studytime	4	649	11.906009	465.077825	3	155.025942	6298.188739	645	9.764634	15.876268	5.705728e-10	0.068765	0.064341	0.05	Reject equal means

Group summary:

group	n	mean	standard_deviation	standard_error	variance	minimum	maximum	ci95_low	ci95_high
1	212	10.844340	3.218624	0.221056	10.359541	0.0	18.0	10.411070	11.277609
2	305	12.091803	3.243125	0.185701	10.517860	0.0	19.0	11.727830	12.455777
3	97	13.226804	2.502104	0.254050	6.260524	8.0	18.0	12.728866	13.724742
4	35	13.057143	3.038410	0.513585	9.231933	6.0	19.0	12.050516	14.063769

SNK range critical table:

snk_ordered_range_size_r	df_error	fixed_alpha	q_critical_snk_alpha_0_05	method_note
2	645	0.05	2.777019	SNK keeps alpha fixed and increases q critical as the ordered range size r increases.
3	645	0.05	3.322176	SNK keeps alpha fixed and increases q critical as the ordered range size r increases.
4	645	0.05	3.642648	SNK keeps alpha fixed and increases q critical as the ordered range size r increases.

Levene / Brown-Forsythe context:

context_test	statistic	p_value	interpretation
Median-centered Levene / Brown-Forsythe context	1.026312	0.380358	SNK is an ANOVA equal-variance post hoc procedure; check homogeneity before interpreting SNK.

SNK homogeneous subset letters:

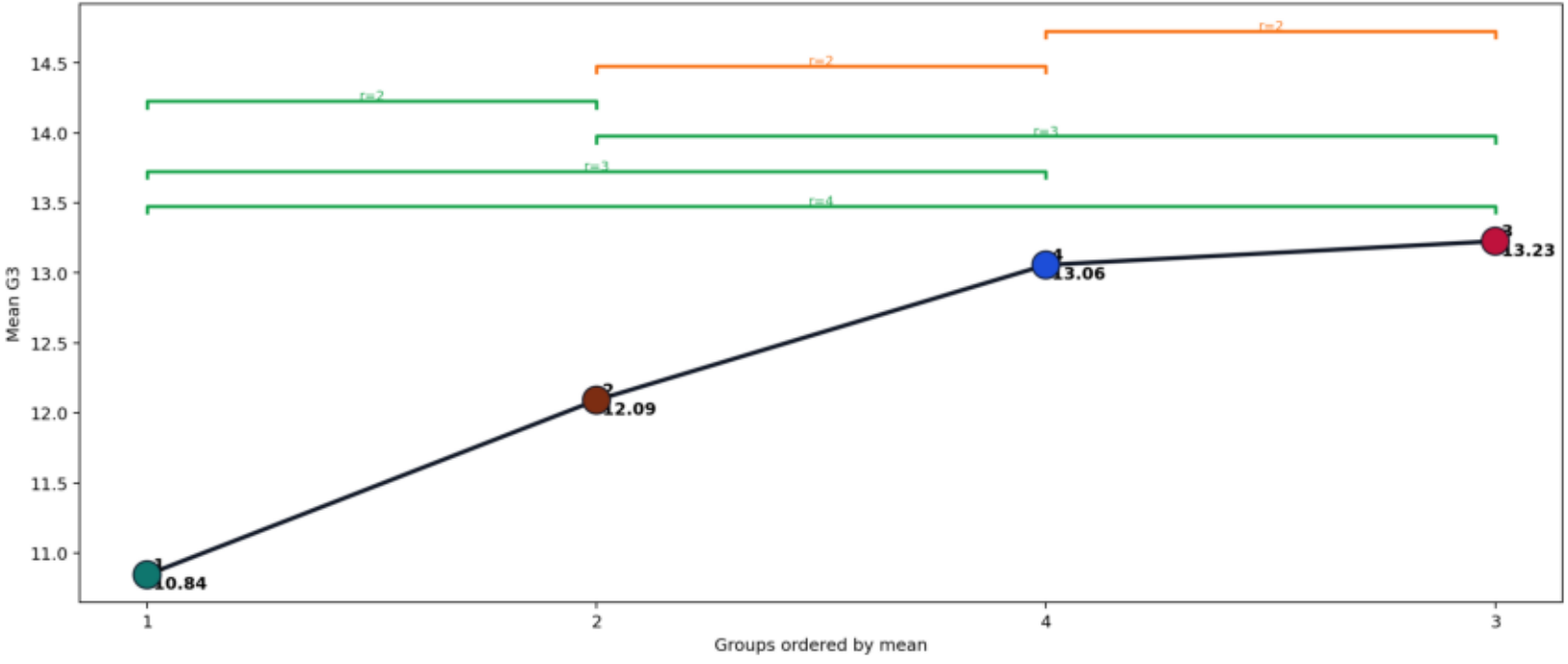
group	mean	n	snk_homogeneous_subset_letters	interpretation
3	13.226804	97	A	Groups sharing a letter are not separated by the SNK comparison map. Check SPSS SNK subsets as official output.
4	13.057143	35	A	Groups sharing a letter are not separated by the SNK comparison map. Check SPSS SNK subsets as official output.
2	12.091803	305	B	Groups sharing a letter are not separated by the SNK comparison map. Check SPSS SNK subsets as official output.
1	10.844340	212	C	Groups sharing a letter are not separated by the SNK comparison map. Check SPSS SNK subsets as official output.

SNK pairwise ordered-range table

comparison_order	snk_ordered_range_size_r	lower_mean_rank	higher_mean_rank	lower_mean_group	higher_mean_group	lower_mean	higher_mean	mean_difference_high_minus_low	snk_standard_error_unequal_n	q_statistic	q_critical_snk_alpha_0_05	critical_mean_difference_snk	df_error	fixed_alpha	studentized_range_p_value_for_r	snk_decision_alpha_0_05	method_not
1	4	1	4	1	3	10.844340	13.226804	2.382465	0.270856	8.796057	3.642648	0.986633	645	0.05	5.367514e-09	Significant True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment
2	3	1	3	1	4	10.844340	13.057143	2.212803	0.403143	5.488874	3.322176	1.339313	645	0.05	3.370027e-04	Significant True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment
3	3	2	4	2	3	12.091803	13.226804	1.135001	0.257567	4.406624	3.322176	0.855683	645	0.05	5.431301e-03	Significant True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment
4	2	1	2	1	2	10.844340	12.091803	1.247464	0.197579	6.313752	2.777019	0.548680	645	0.05	9.473280e-06	Significant True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment
5	2	2	3	2	4	12.091803	13.057143	0.965340	0.394338	2.448001	2.777019	1.095084	645	0.05	8.393031e-02	Not significant True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment
6	2	3	4	4	3	13.057143	13.226804	0.169661	0.435692	0.389406	2.777019	1.209926	645	0.05	7.831343e-01	Not significant True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment

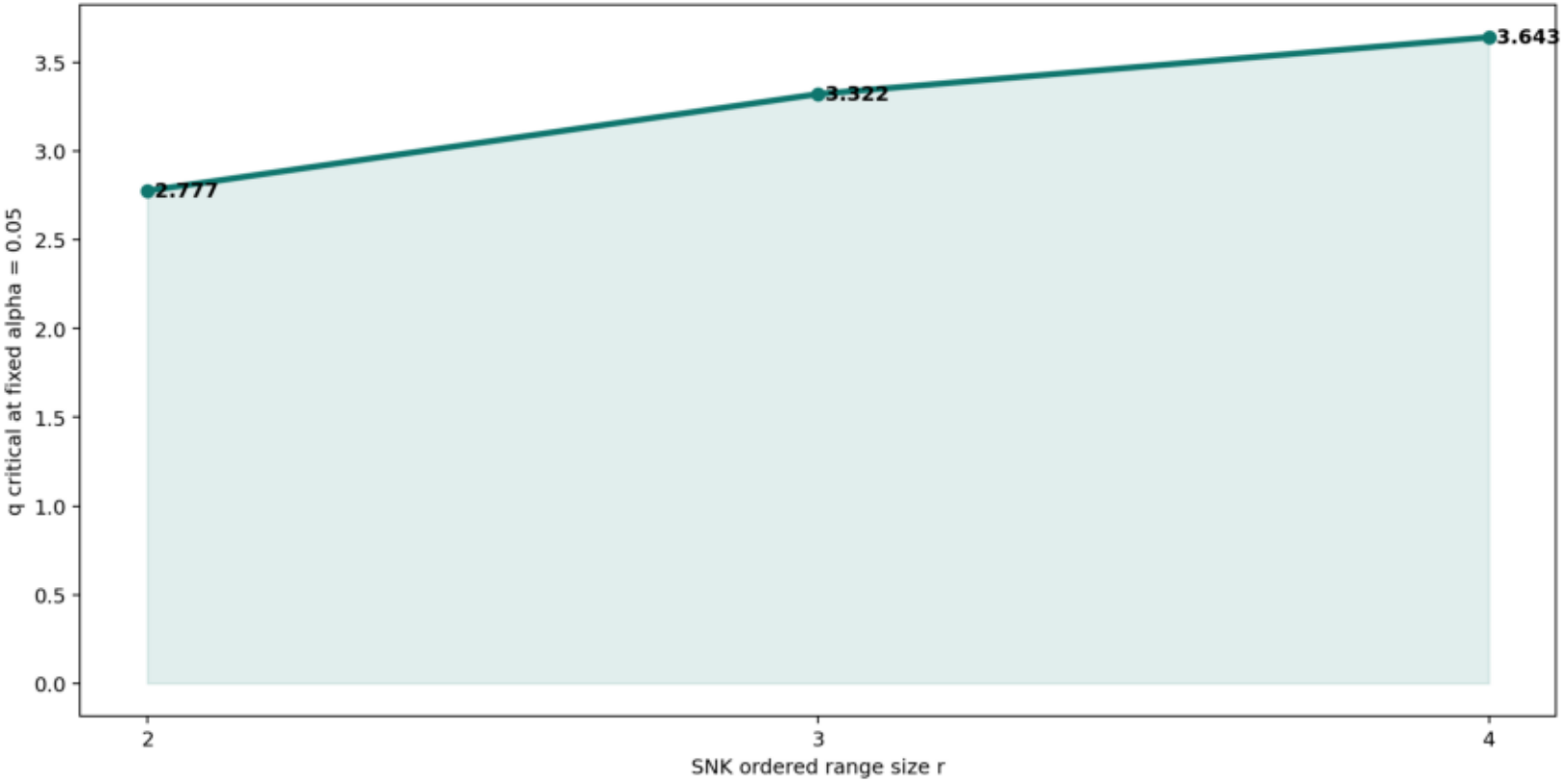
SNK Ordered Mean Ladder

Brackets show ordered-range comparisons; r is the number of means spanned by each SNK test.



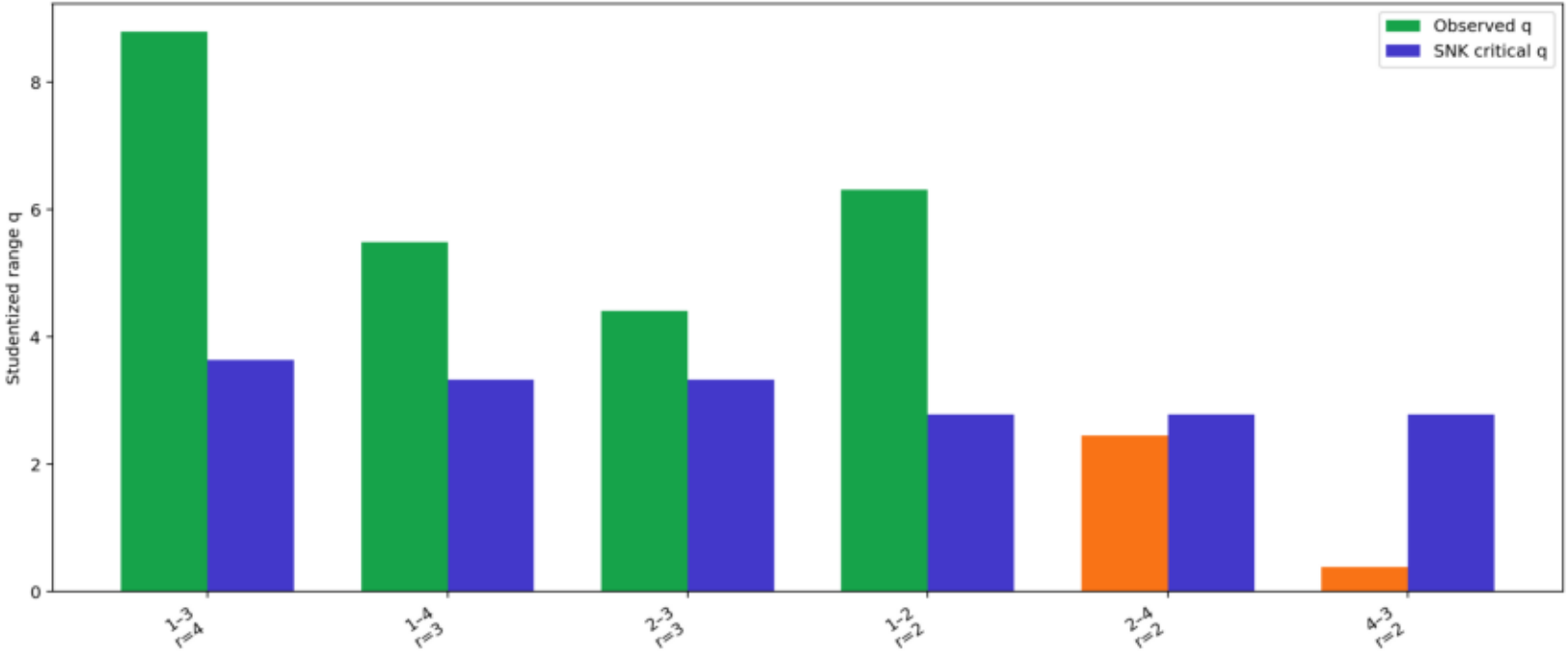
Student-Newman-Keuls Critical q by Range Size

Unlike REGW, alpha stays fixed; the q critical value changes only because r changes.



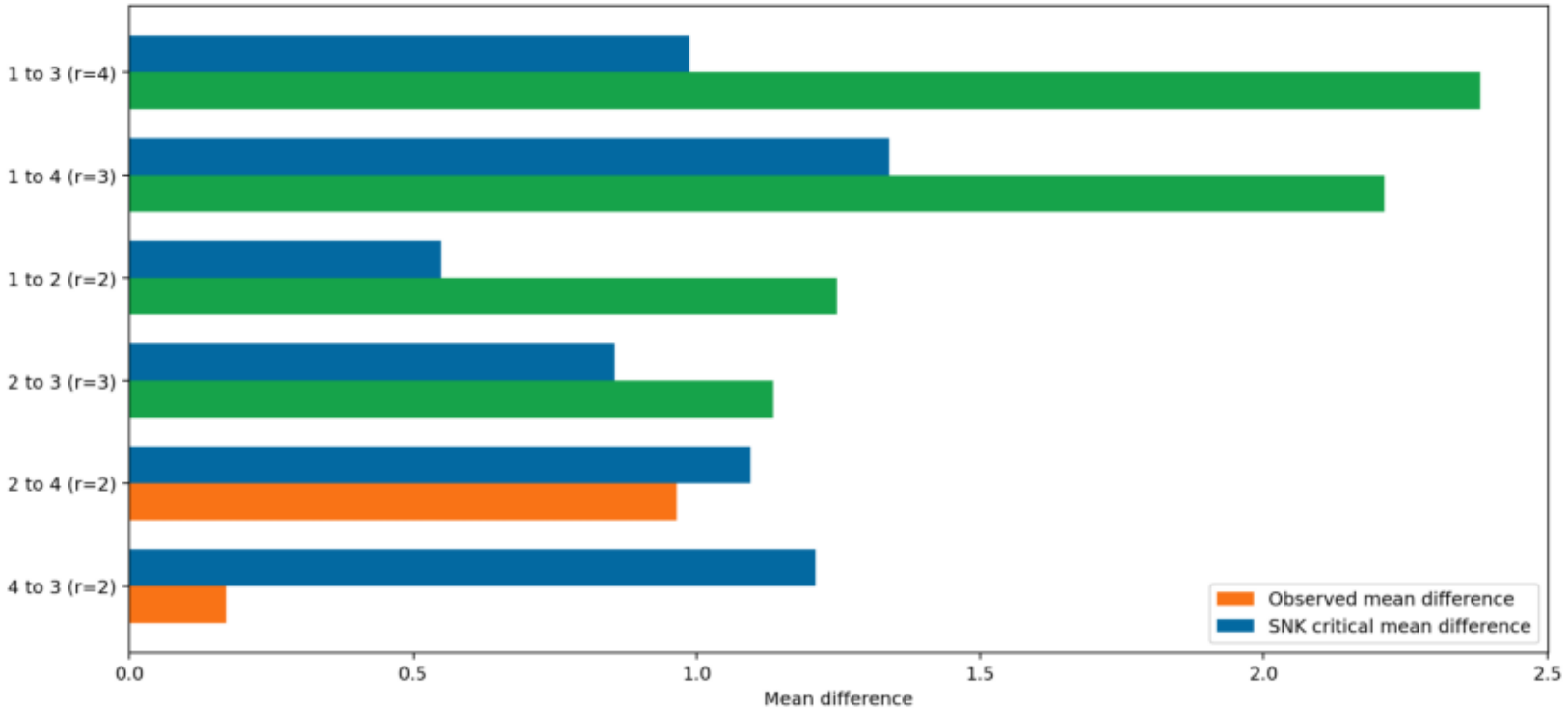
SNK q Statistic vs Range-Specific Critical q

Each pair uses the q critical value for its own ordered range size r.



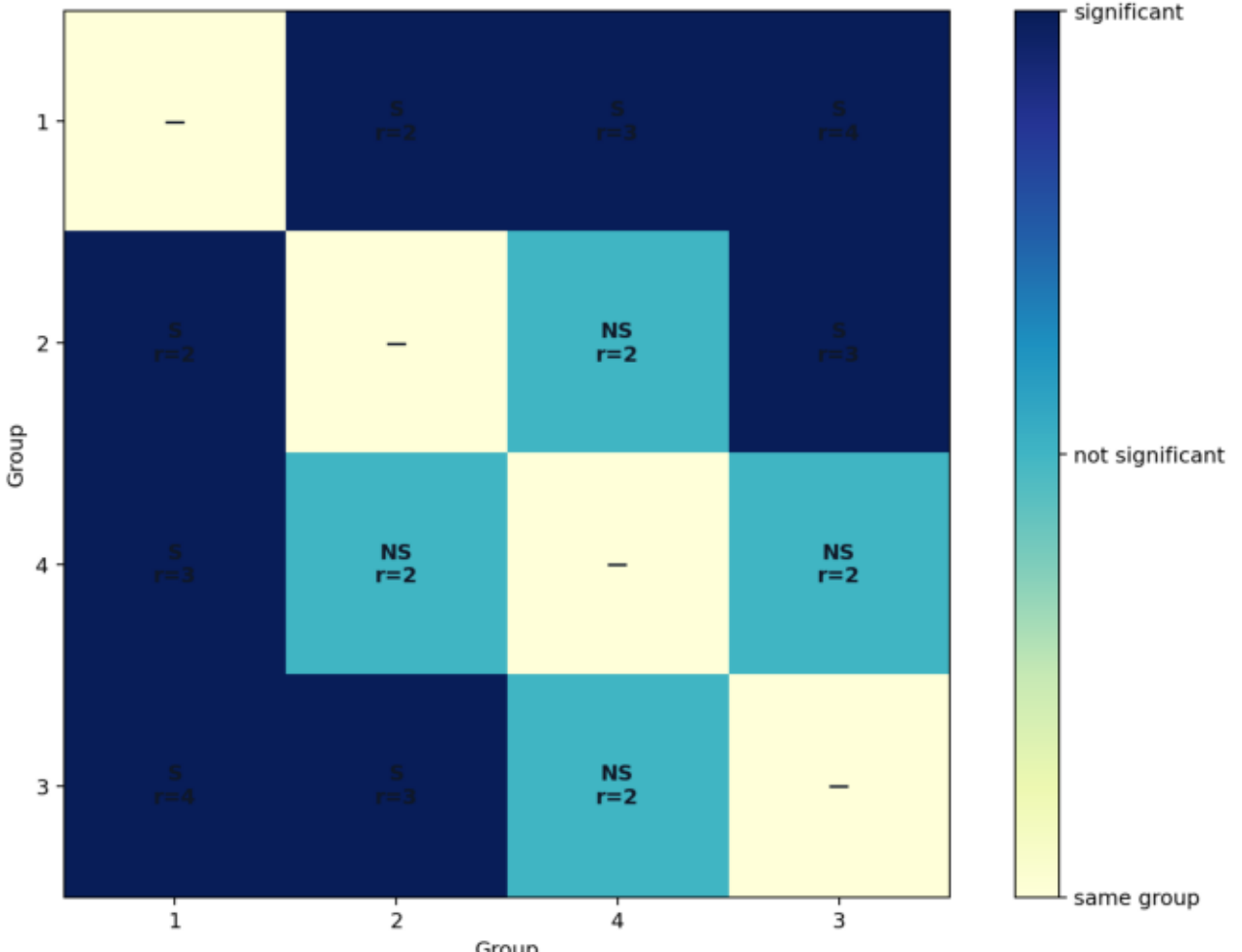
SNK Mean Difference Test Thresholds

A pair is significant when the observed mean gap exceeds the SNK range-specific critical gap.



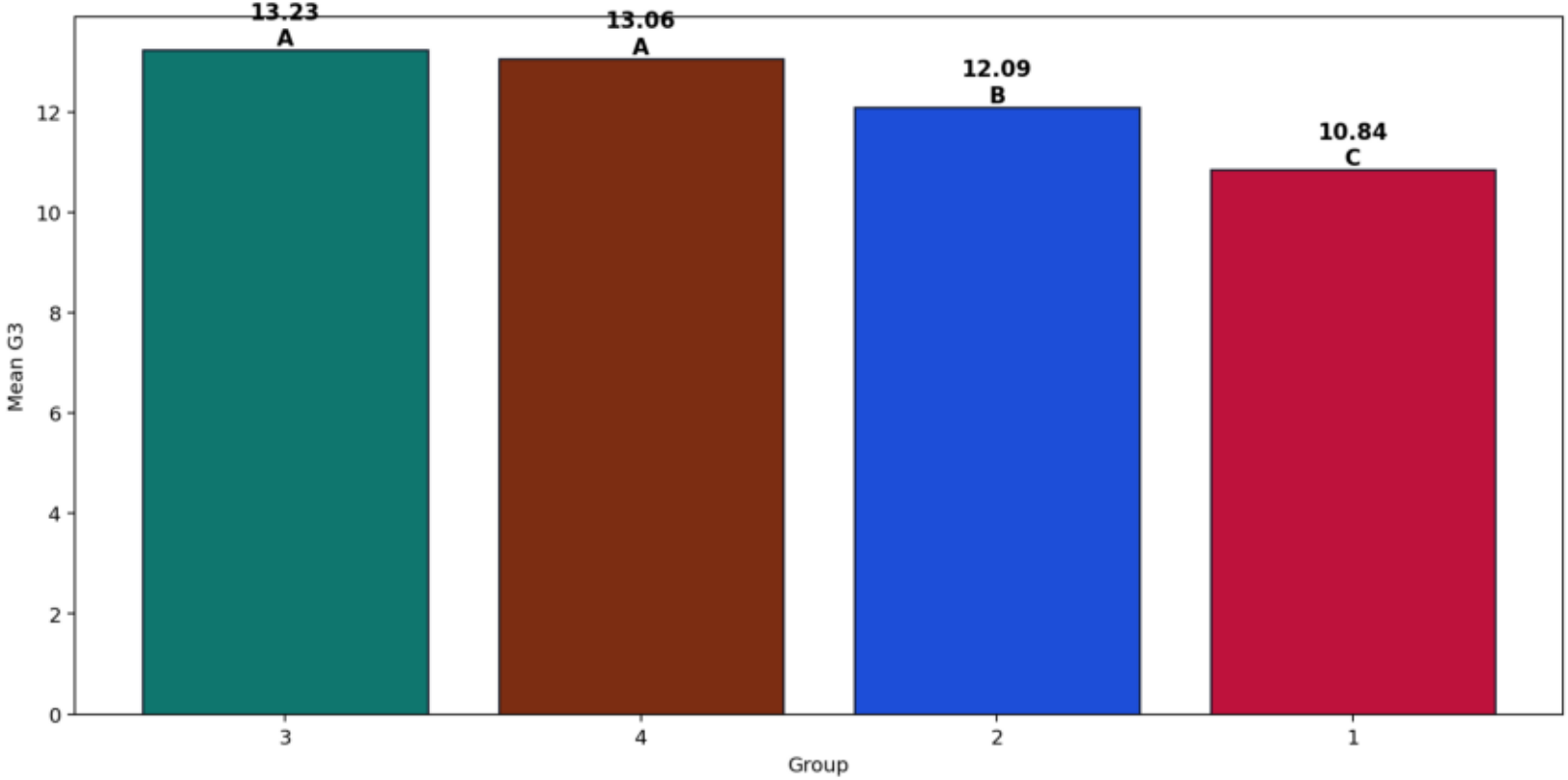
SNK Pairwise Decision Matrix

Cells show SNK decision and ordered range size r for each pair of group means.



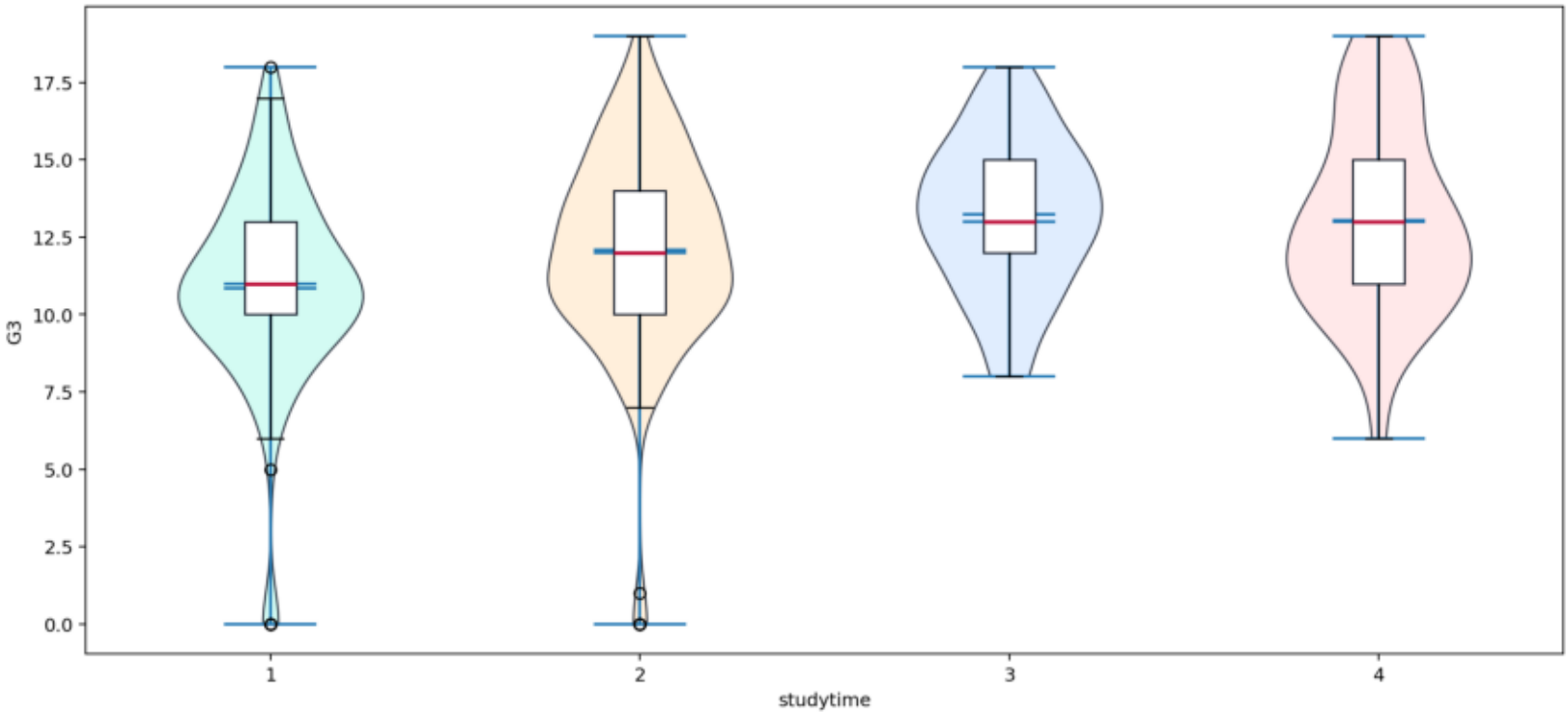
SNK Homogeneous Subset Letters

Groups sharing a letter are not separated by the SNK pairwise comparison map.



SNK Distribution Context

Violin and box overlays show group spread before interpreting SNK ordered-range decisions.



SNK Method Report Card

This chart is intentionally SNK-specific: fixed alpha, r-specific q critical, no REGW rule.

SNK item	Value
Procedure	Student-Newman-Keuls / SNK
REGW alpha adjustment	Not used
Fixed alpha	0.05
Number of groups	4
ANOVA F	15.8763
ANOVA p	0.000000
MSE	9.7646
df error	645
SNK significant comparisons	4 of 6
Variance context p	0.380358