

Student-Newman-Keuls / SNK Post Hoc Analysis

This report is SNK-specific and is not a Ryan-Einot-Gabriel-Welsch copy.  
SNK uses fixed alpha .05 and range-size-specific Studentized Range critical values.  
No REGW layer-alpha adjustment is used.

ANOVA result:

target_variable	group_variable	number_of_groups	total_n		
1	G3	studytime	4 649		
grand_mean	ss_between	df_between	ms_between	ss_within_error	
1	11.90601	465.0778	3	155.0259	6298.189
df_within_error	ms_within_error	f_statistic	p_value		
1	645	9.764634	15.87627	5.705728e-10	
eta_squared	omega_squared	alpha	anova_decision_alpha_0_05		
1	0.06876527	0.06434105	0.05	Reject equal means	

Group summary:

group	n	mean	standard_deviation	standard_error	variance	
1	1	212	10.84434	3.218624	0.2210560	10.359541
2	2	305	12.09180	3.243125	0.1857008	10.517860
3	3	97	13.22680	2.502104	0.2540502	6.260524
4	4	35	13.05714	3.038410	0.5135850	9.231933
minimum	maximum	ci95_low	ci95_high			
1	0	18	10.41107	11.27761		
2	0	19	11.72783	12.45578		
3	8	18	12.72887	13.72474		
4	6	19	12.05052	14.06377		

SNK range critical table:

snk_ordered_range_size_r	df_error	fixed_alpha	
1	2	645	0.05
2	3	645	0.05
3	4	645	0.05

q\_critical\_snk\_alpha\_0\_05

1	2.777019
2	3.322176
3	3.642648

method\_note

1 SNK keeps alpha fixed and increases q critical as ordered range size r increases.  
2 SNK keeps alpha fixed and increases q critical as ordered range size r increases.  
3 SNK keeps alpha fixed and increases q critical as ordered range size r increases.

Levene context:

context_test	statistic
1 Median-centered Levene / Brown-Forsythe context	1.026312
p_value	
1	0.3803575

interpretation

1 SNK is an ANOVA equal-variance post hoc procedure; check homogeneity before interpreting SNK.

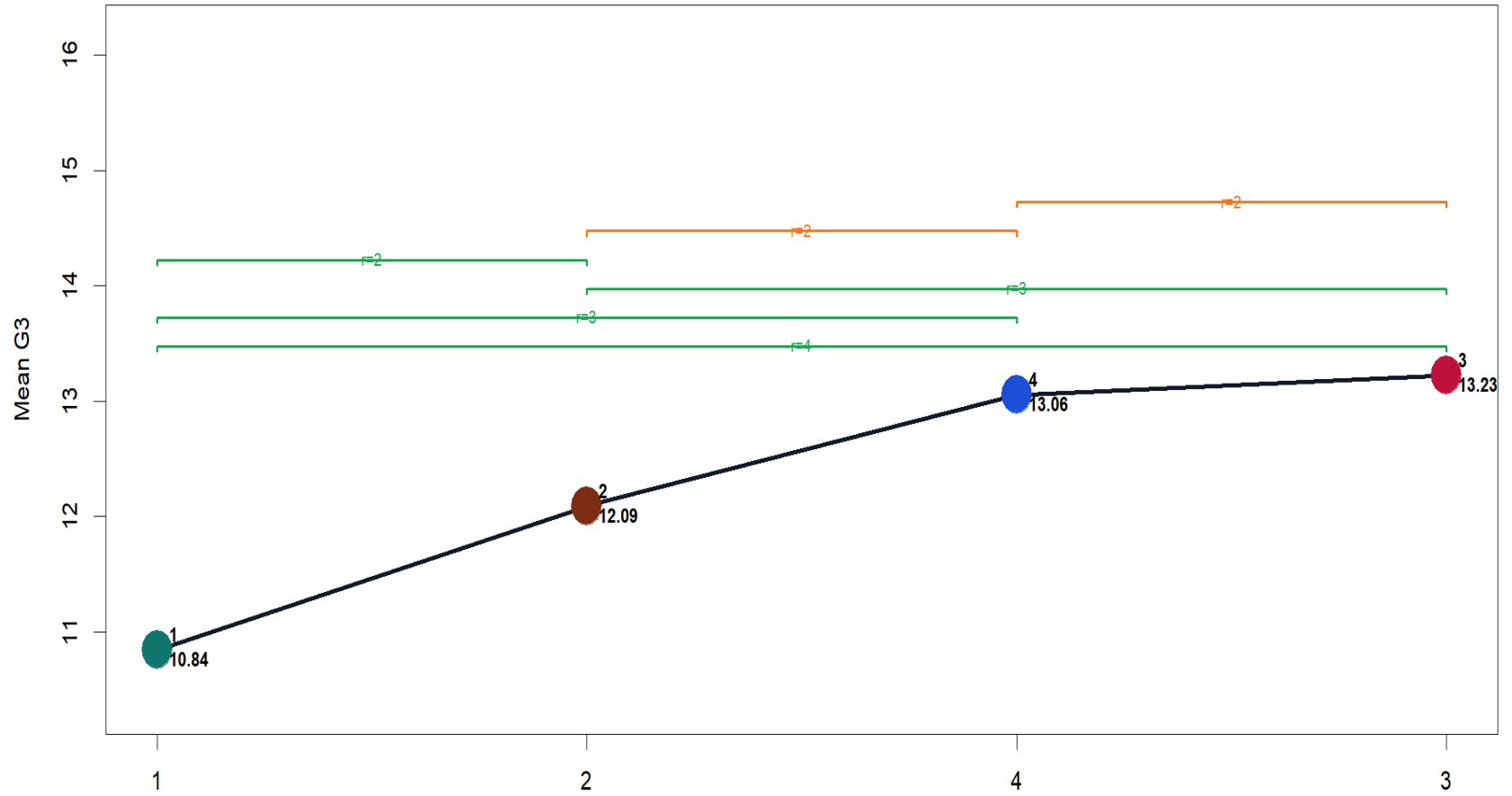
SNK homogeneous subset letters:

group	n	mean	snk_homogeneous_subset_letters
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SNK pairwise ordered-range table

comparison_order	snk_ordered_range_size_r	lower_mean_rank	higher_mean_rank	lower_mean
1	1	4	1	
2	2	3	1	
3	3	3	2	
4	4	2	1	
5	5	2	2	
6	6	2	3	
higher_mean_rank	lower_mean_group	higher_mean_group	lower_mean	
1	4	1	3	10.84434
2	3	1	4	10.84434
3	4	2	3	12.09180
4	2	1	2	10.84434
5	3	2	4	12.09180
6	4	4	3	13.05714
higher_mean	mean_difference_high_minus_low			
1	13.22680	2.3824645		
2	13.05714	2.2128032		
3	13.22680	1.1350008		
4	12.09180	1.2474637		
5	13.05714	0.9653396		
6	13.22680	0.1696613		
snk_standard_error_unequal_n	q_statistic			
1	0.2708560	8.796057		
2	0.4031434	5.488874		
3	0.2575670	4.406624		
4	0.1975788	6.313752		
5	0.3943379	2.448001		
6	0.4356925	0.389406		
q_critical_snk_alpha_0_05	critical_mean_difference_snk	df_error		
1	3.642648	0.9866329	645	
2	3.322176	1.3393130	645	
3	3.322176	0.8556828	645	
4	2.777019	0.5486801	645	
5	2.777019	1.0950836	645	
6	2.777019	1.2099261	645	
fixed_alpha	studentized_range_p_value_for_r			
1	0.05	5.071332e-09		
2	0.05	3.370024e-04		
3	0.05	5.431300e-03		
4	0.05	9.472984e-06		
5	0.05	8.393031e-02		
6	0.05	7.831343e-01		
snk_decision_alpha_0_05				
1	Significant			
2	Significant			
3	Significant			
4	Significant			
5	Not significant			
6	Not significant			
method_note				
1	True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment.			
2	True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment.			
3	True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment.			
4	True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment.			
5	True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment.			
6	True SNK: fixed alpha .05; q critical depends on ordered range size r; no REGW alpha adjustment.			

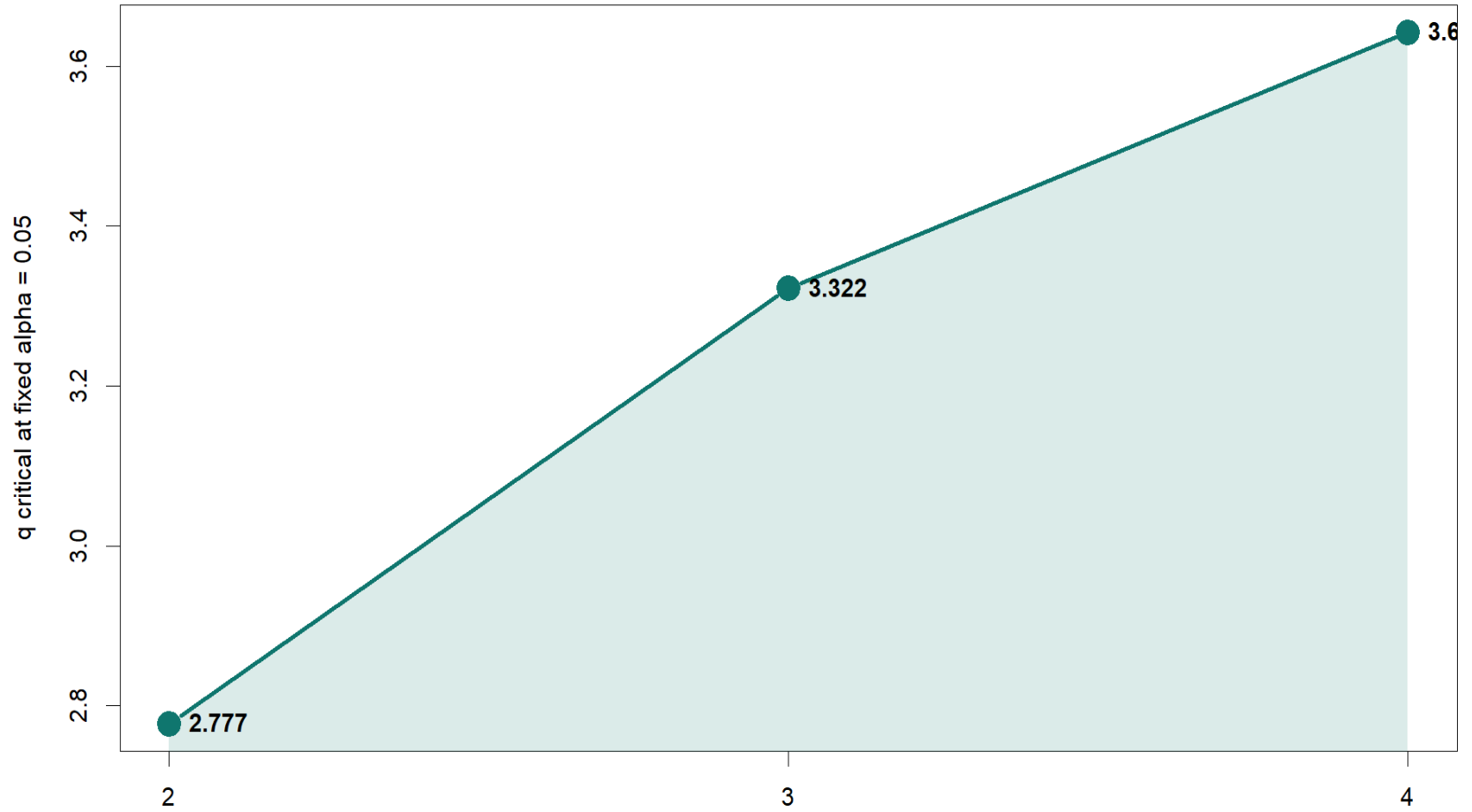
### SNK Ordered Mean Ladder



Groups ordered by mean

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

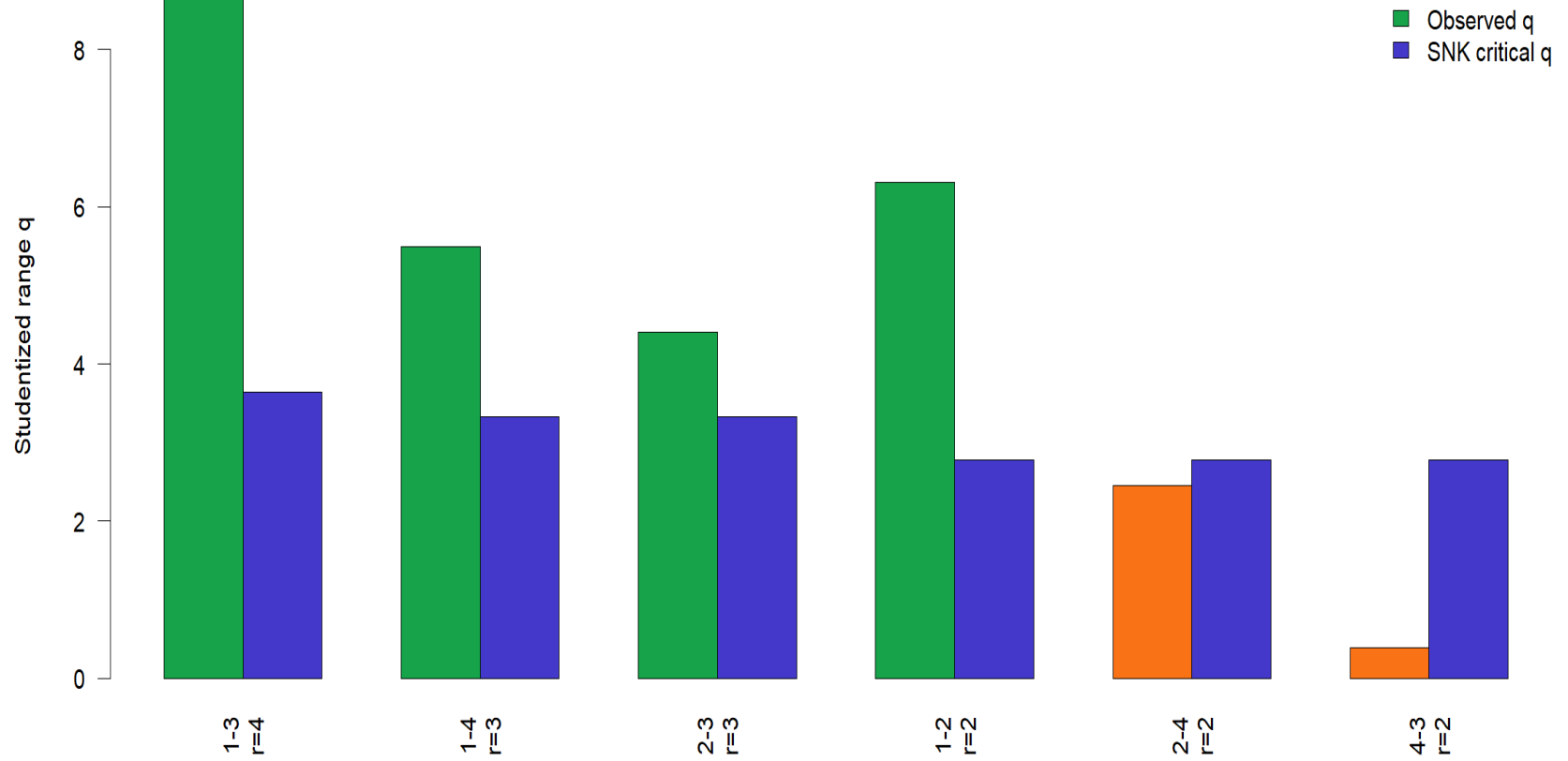
### Student-Newman-Keuls Critical q by Range Size



SNK ordered range size r

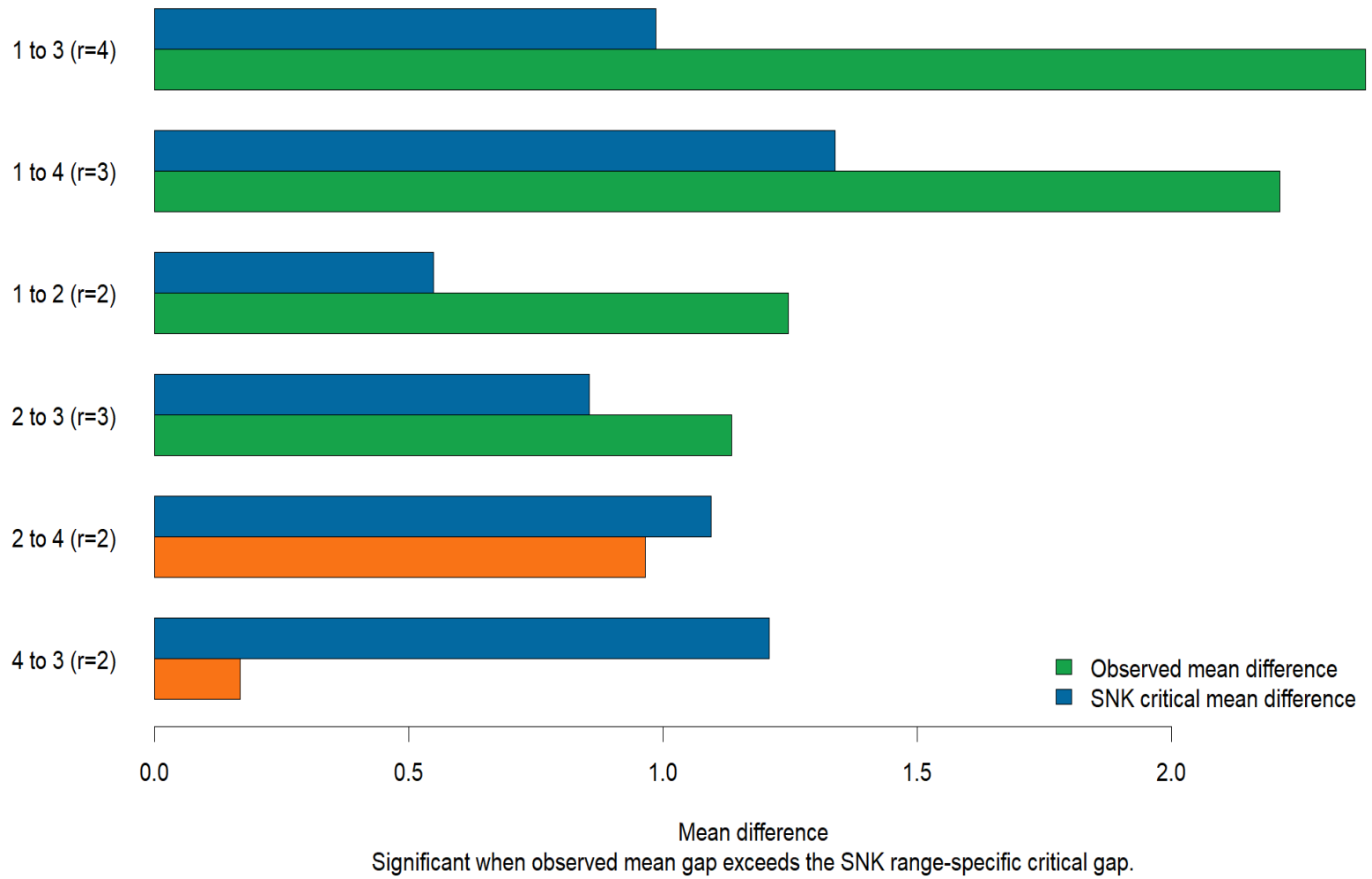
Unlike REGW, alpha stays fixed; the q critical value changes only because r changes.

### SNK q Statistic vs Range-Specific Critical q

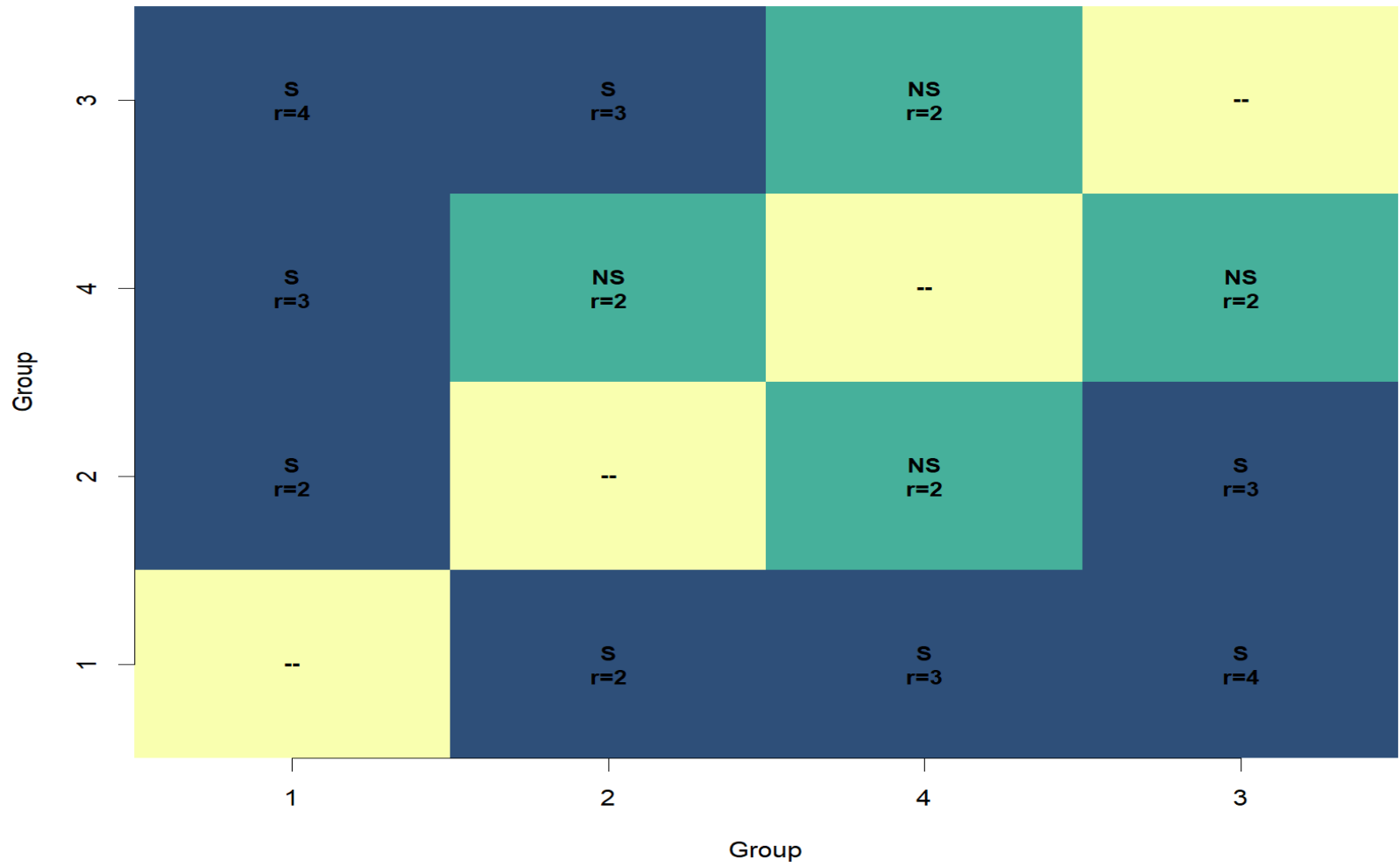


Each pair uses the q critical value for its own ordered range size r.

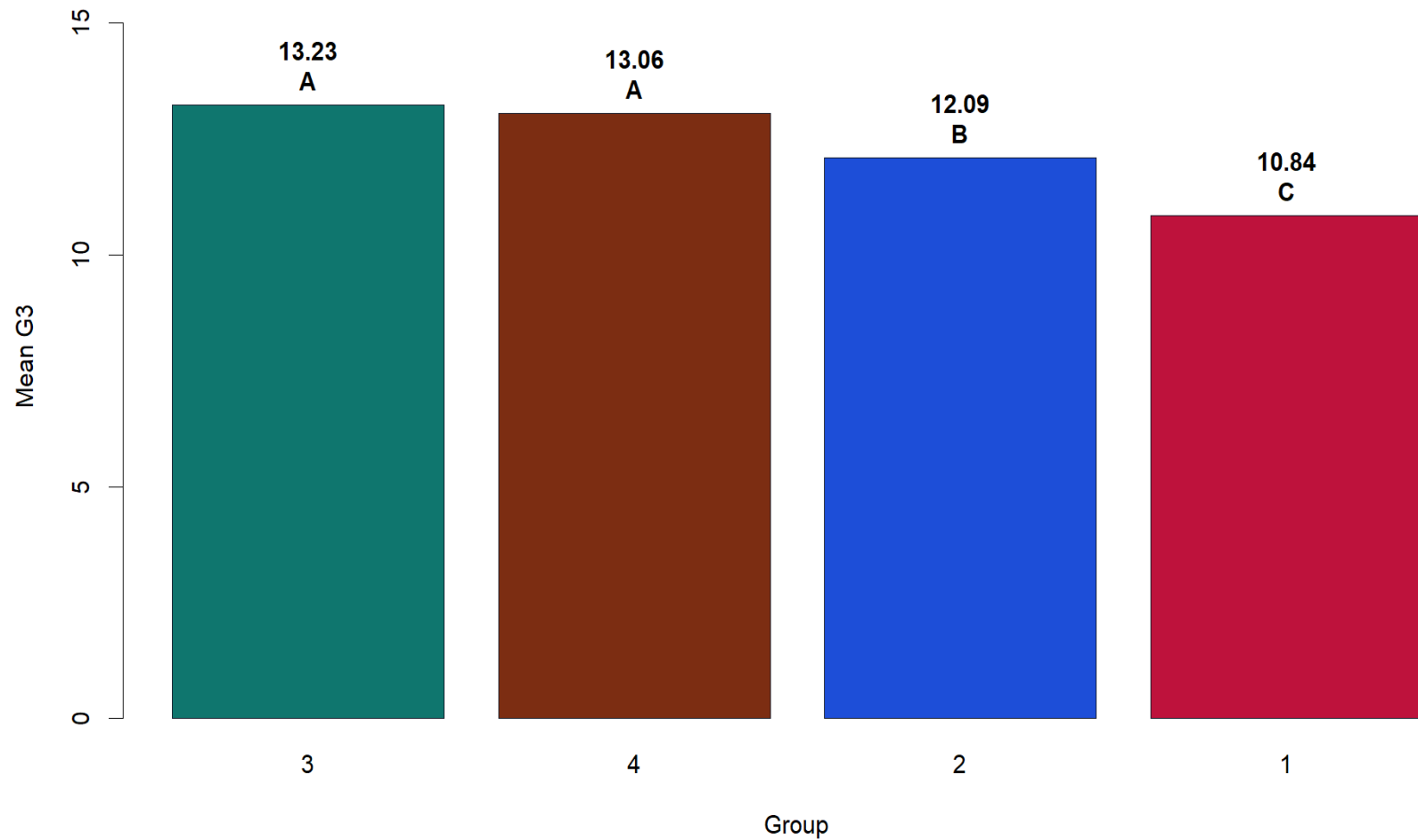
### SNK Mean Difference Test Thresholds



### SNK Pairwise Decision Matrix

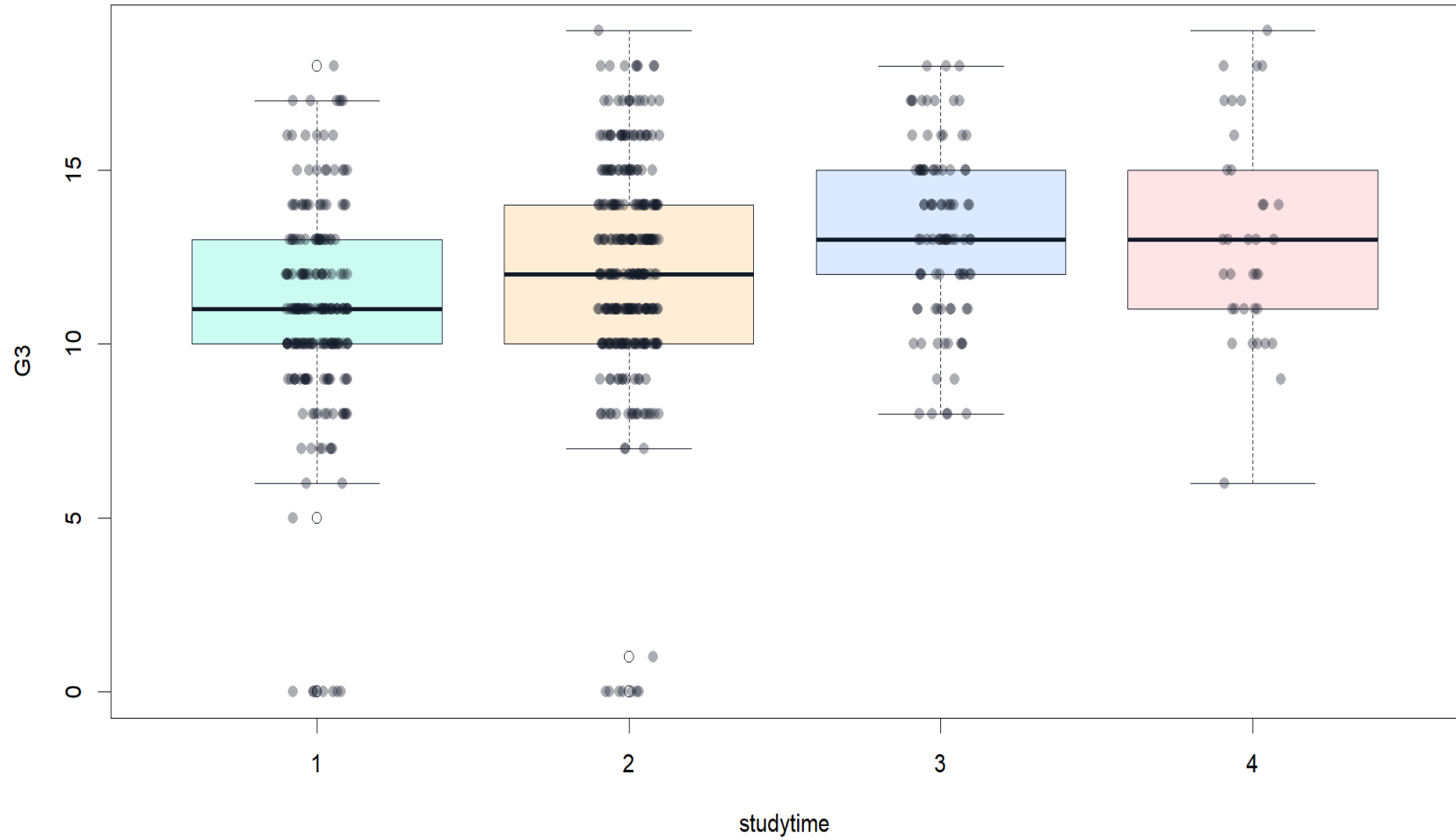


### SNK Homogeneous Subset Letters



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

### SNK Distribution Context



Boxplots show group spread before interpreting SNK ordered-range decisions.

## SNK Method Report Card

**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

Fixed alpha, r-specific q critical, no REGW rule.