

Kendall's Tau Correlation Analysis

Primary variables: G1 and G3

H0: Kendall's tau-b = 0; no monotonic association.

H1: Kendall's tau-b is not 0; monotonic association exists.

Primary result:

x_variable	y_variable	n_complete_pairs	total_observation_pairs	concordant_pairs	discordant_pairs	x_ties_only	y_ties_only	ties_on_both_variables	kendalls_tau_b_manual	kendalls_tau_b	p_value_two_tailed	alpha	direction
G1	G3	649	210276	158466	13791	16516	16614	4889	0.7661978	0.7661978	2.108694e-155	0.05	positive
practical_strength_label													
decision													
strong Reject H0: significant monotonic association													
method_note													

R cor.test(method='kendall', exact=FALSE); tie-aware asymptotic test

Top pairwise results:

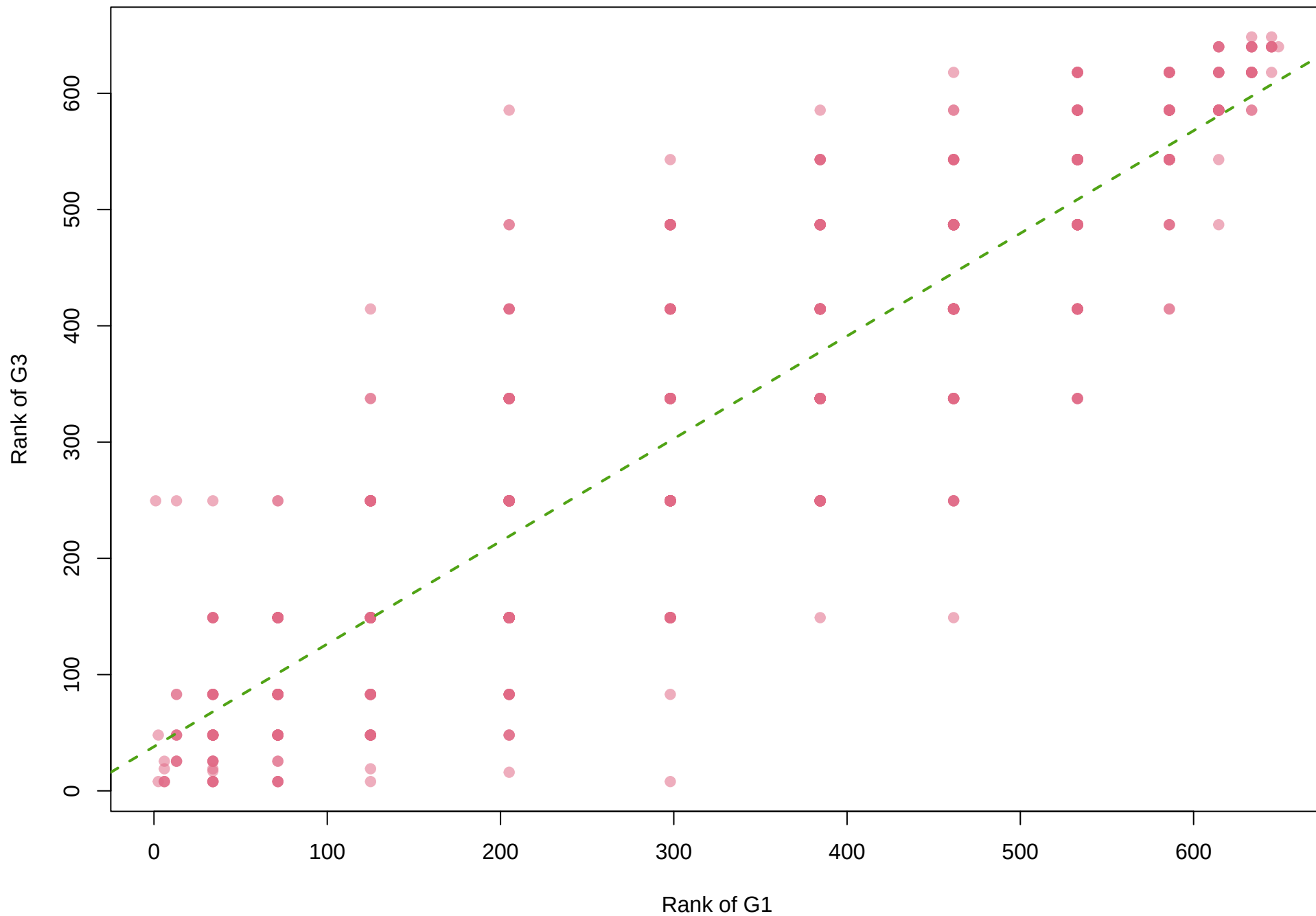
variable_1	variable_2	n_complete_pairs	kendalls_tau_b	p_value_two_tailed	abs_tau
G2	G3	649	0.8695948	2.113285e-199	0.8695948
G1	G2	649	0.7806392	4.403489e-161	0.7806392
G1	G3	649	0.7661978	2.108694e-155	0.7661978
Fedu	Medu	649	0.5699543	5.622318e-68	0.5699543
Dalc	Walc	649	0.5554070	4.096093e-59	0.5554070
failures	G3	649	-0.3788835	2.182742e-30	0.3788835
failures	G2	649	-0.3679693	9.916502e-29	0.3679693
failures	G1	649	-0.3657803	1.963360e-28	0.3657803
goout	Walc	649	0.3149073	1.732229e-22	0.3149073
freetime	goout	649	0.3039036	6.841912e-21	0.3039036
age	failures	649	0.2583665	1.259734e-13	0.2583665
Medu	traveltime	649	-0.2306261	2.076133e-11	0.2306261

Assumption/reporting context:

check	requirement	status
Variable scale	Two ordinal, interval, or ratio variables	Use numeric/ordinal columns only
Observation independence	Independent rows/cases	Confirm from study design
Monotonic pattern	Monotonic relationship	Review rank scatterplot
Ties	Ties may occur	Tau-b tie correction used
Missing values	Complete pairs for each test	Pairwise complete observations used
why_it_matters		
Kendall's Tau is rank-based and suitable for ordinal data.		
Dependence can make p-values too small.		
Tau measures ordered agreement rather than linear slope.		
Grade data often contain ties; tau-b is the correct version to report.		
Each pairwise test may have a different valid n.		

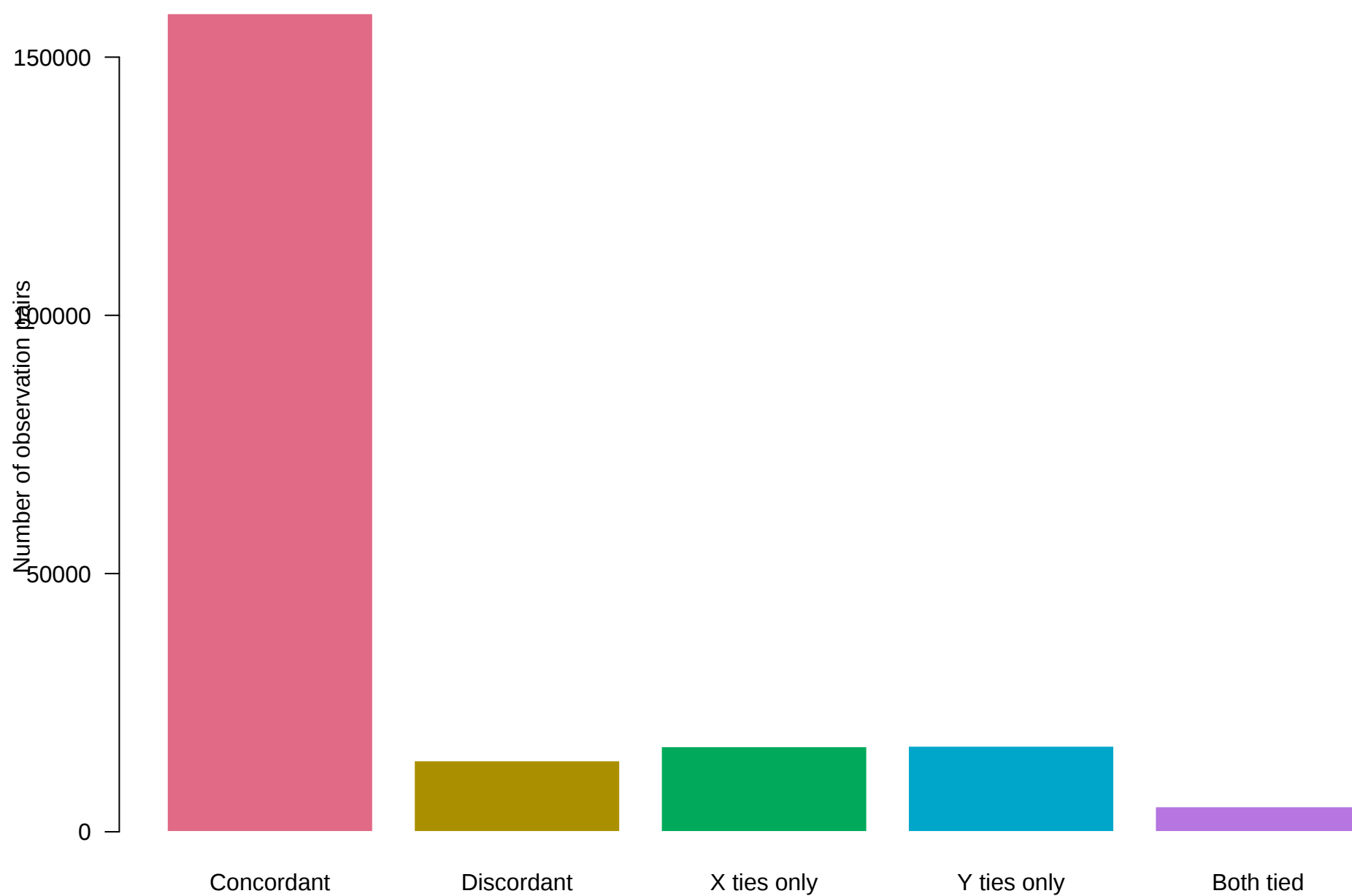
Kendall's Tau: Colorful Rank Scatterplot

$\tau\text{-b} = 0.7662$; $p = 2.109\text{e-}155$



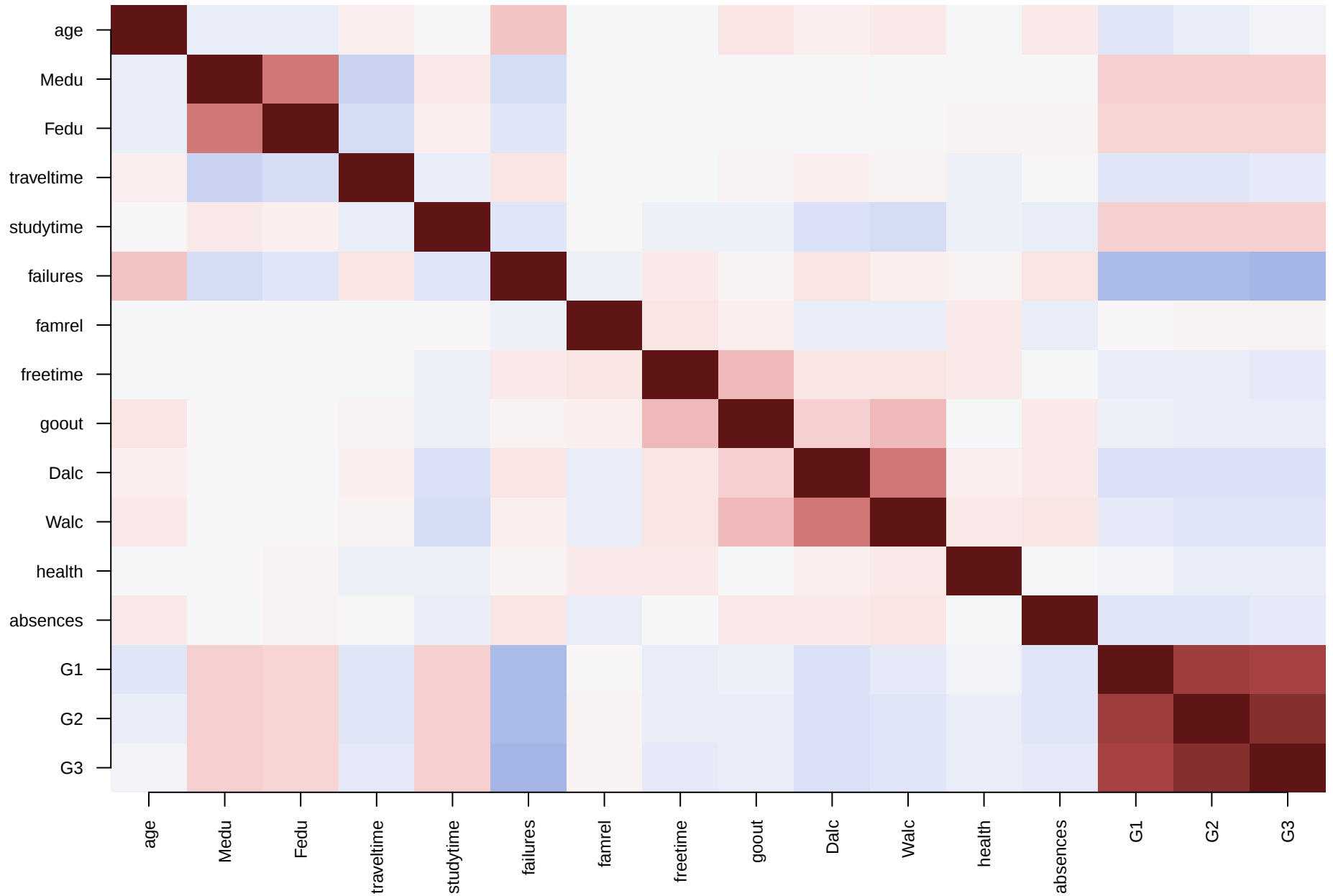
Kendall's Tau: Colorful Pair Classification Counts

Tau-b compares concordant and discordant orderings with tie correction.



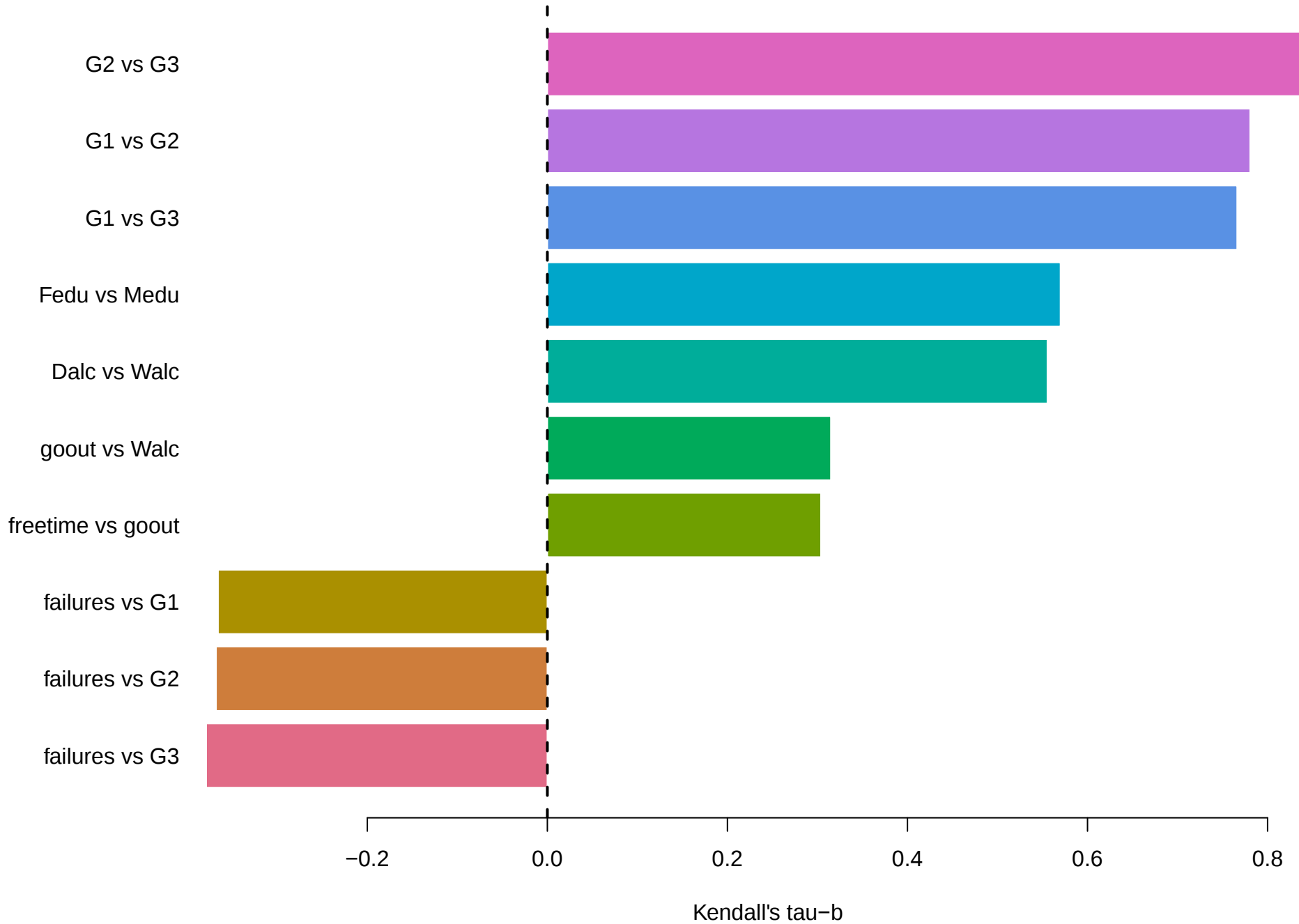
Kendall's Tau Matrix

Warm colors are positive ordered associations; cool colors are negative associations.



Top Kendall's Tau Relationships

Pairs are ranked by absolute tau-b.



Primary Variable Distributions

Many tied grade values are expected, so tau-b is reported.

