One Chain, Two Chain, Three Chain, More?

A Monte Carlo Study

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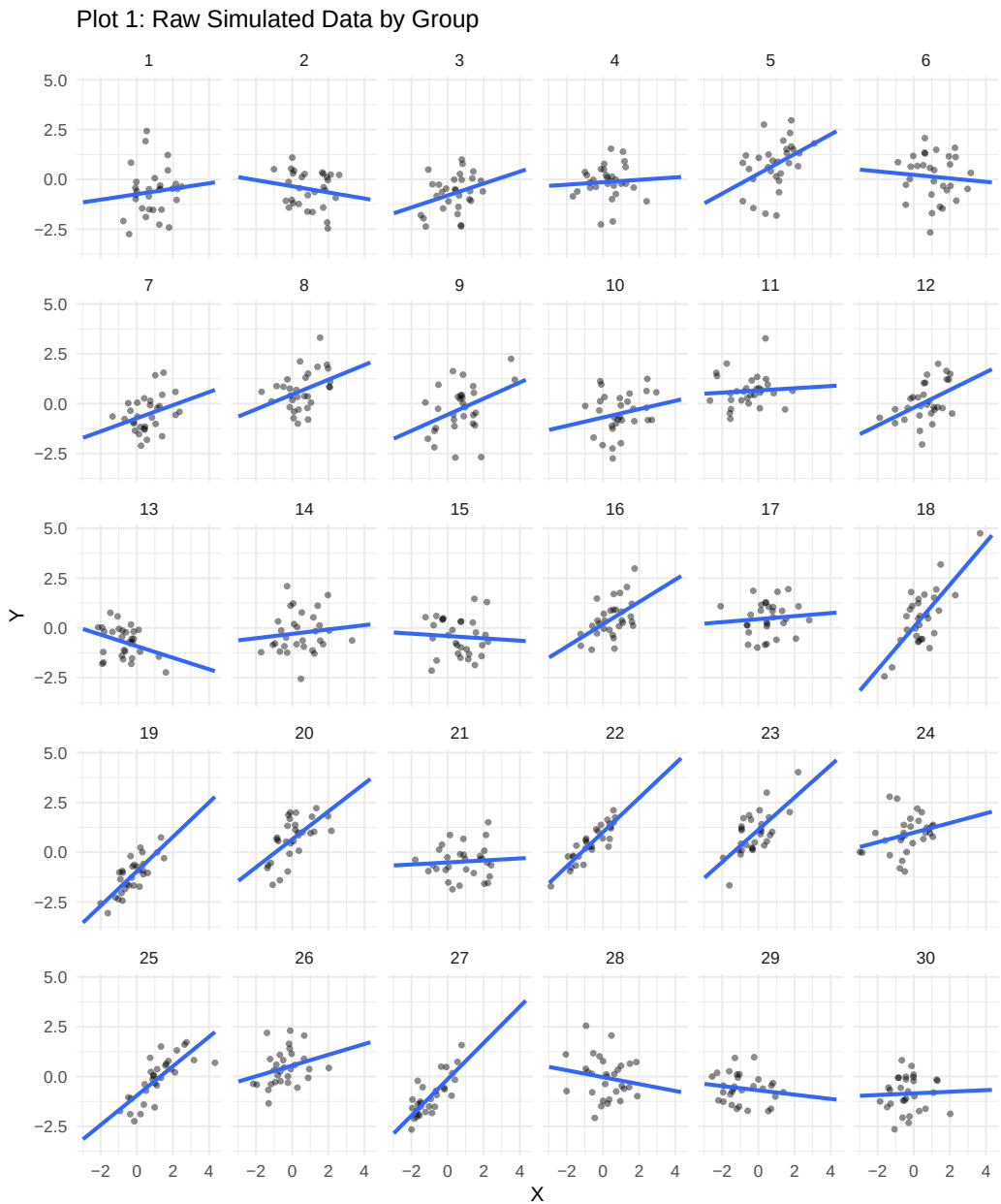
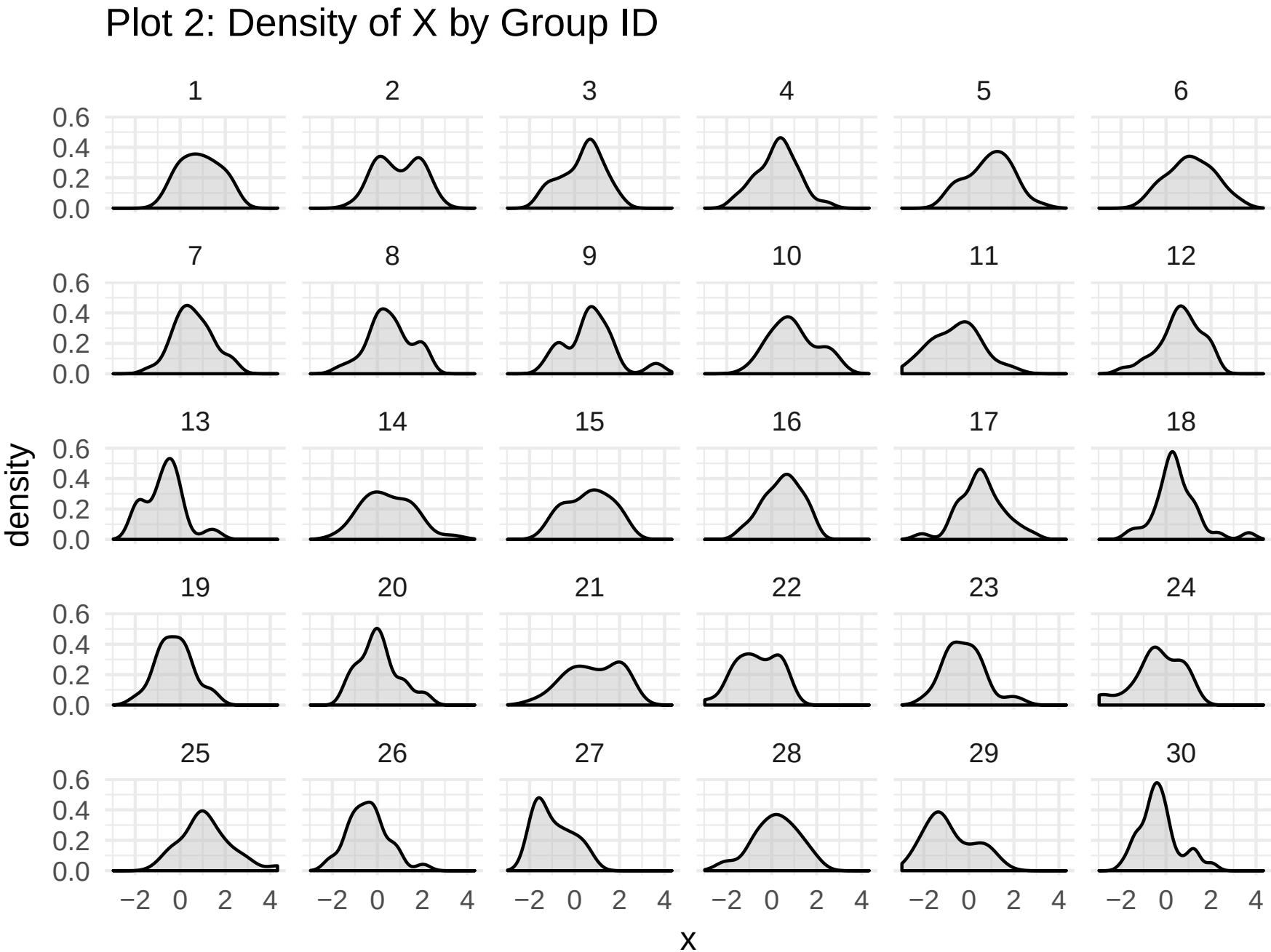
Outline

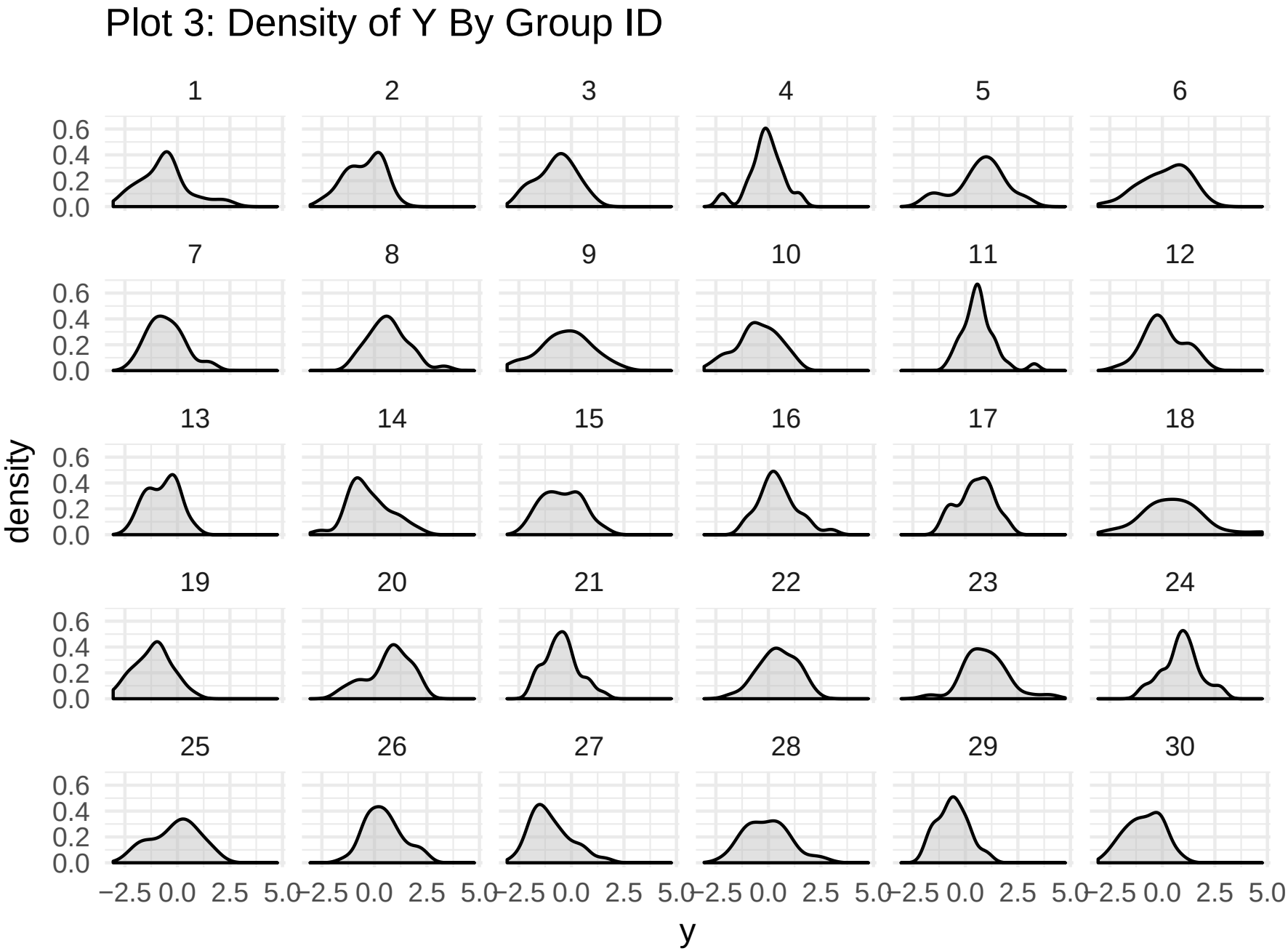
Data Generation



Data Generation



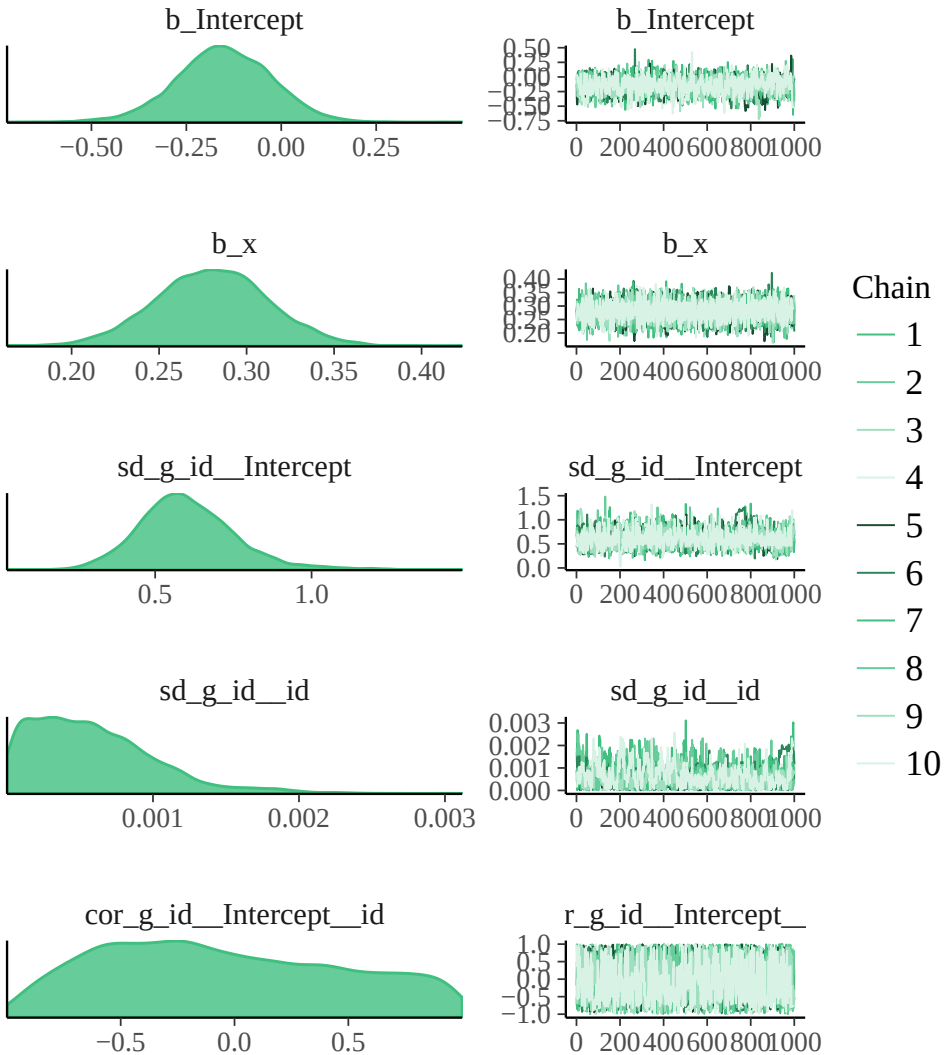
Data Generation



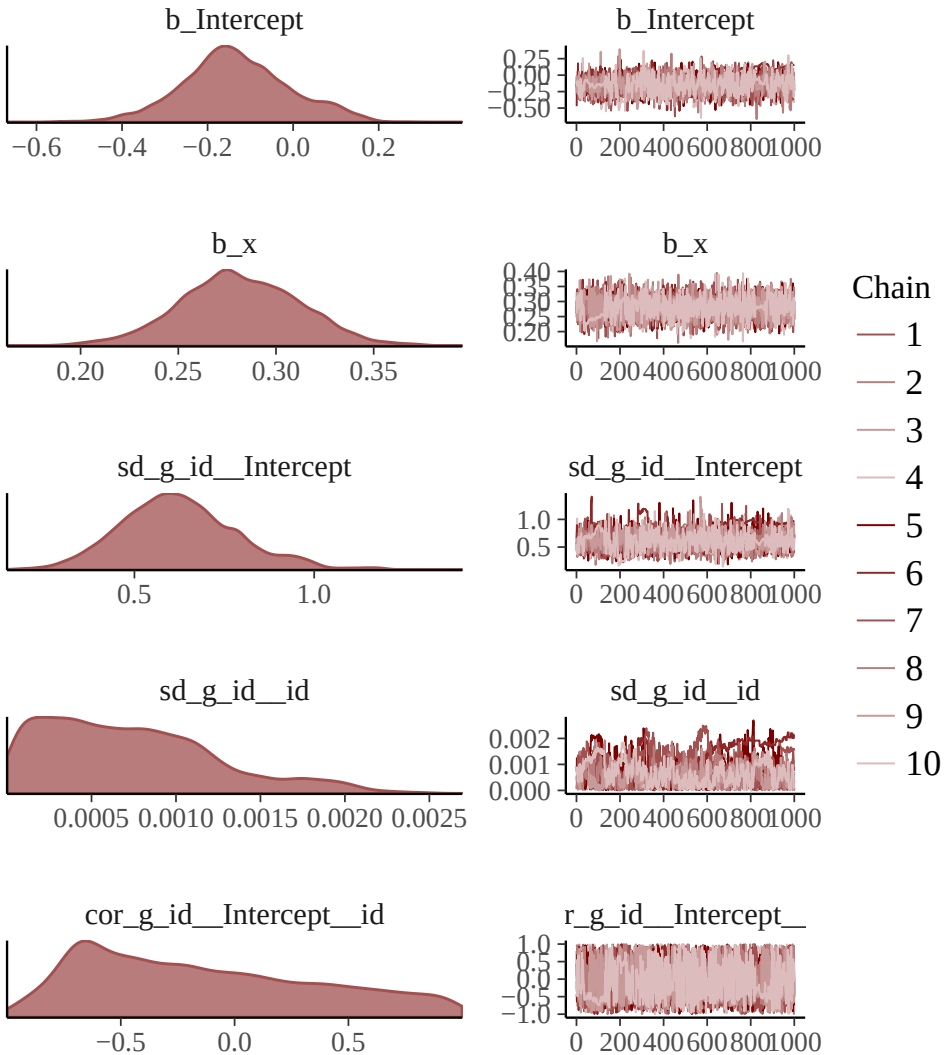
Prior Conditions

Prior	Values	Parameter	Coefficient
	Diffuse		
Uniform	-100, 100	β	X
LKJ	1	-	Group ID
Student-t	3, 0, 10	SD	Group ID
Uniform	0, 100	SD	ID / G ID
Uniform	-100, 100	Sigma	-
	Strong and Incorrect		
Gaussian	10, 0.1	β	X
LKJ	1	-	Group ID
Student-t	3, 0, 10	SD	-
Student-t	3, 0, 10	SD	ID / G ID
Student-t	3, 0, 10	Sigma	-
	Realistic		
Gaussian	0, 1	β	X
LKJ	1	-	Group ID
Student-t	3, 0, 10	SD	-
Student-t	3, 0, 10	SD	ID / G ID
Student-t	3, 0, 10	Sigma	-

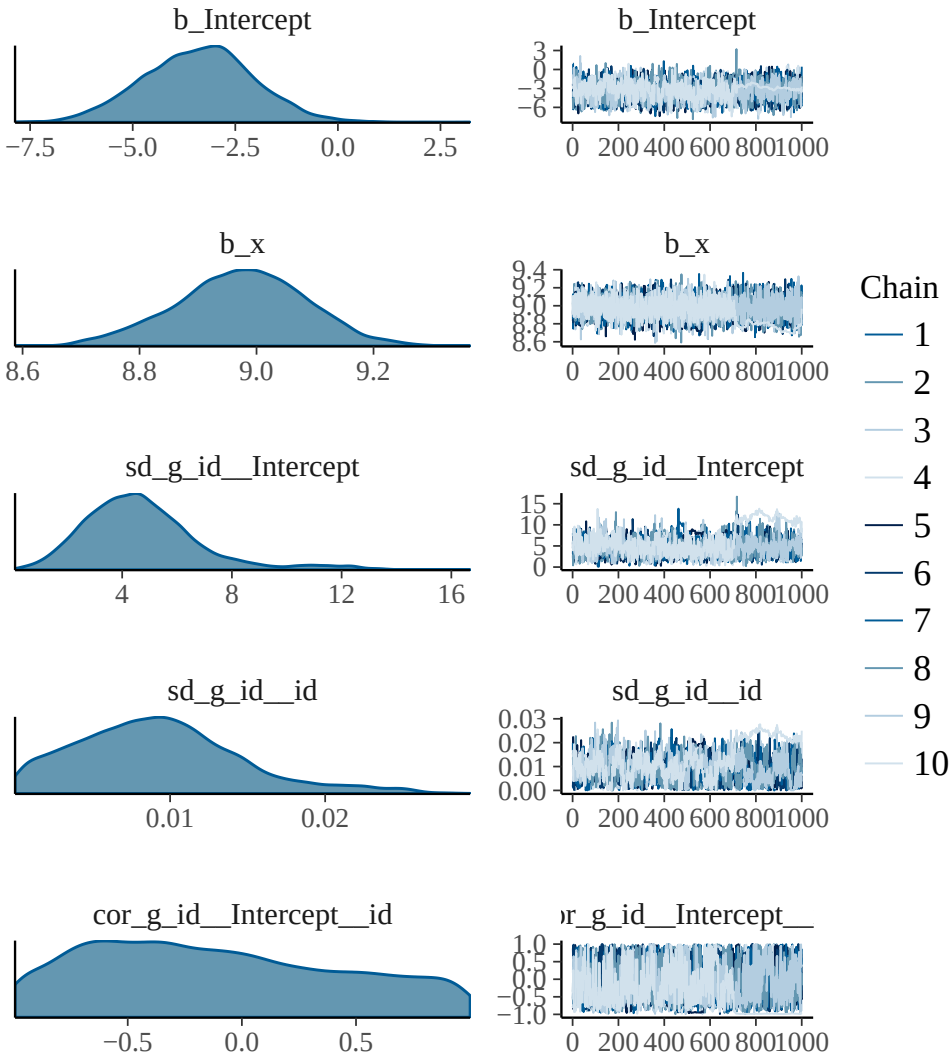
Results and Convergence: Realistic



Results and Convergence: Diffuse



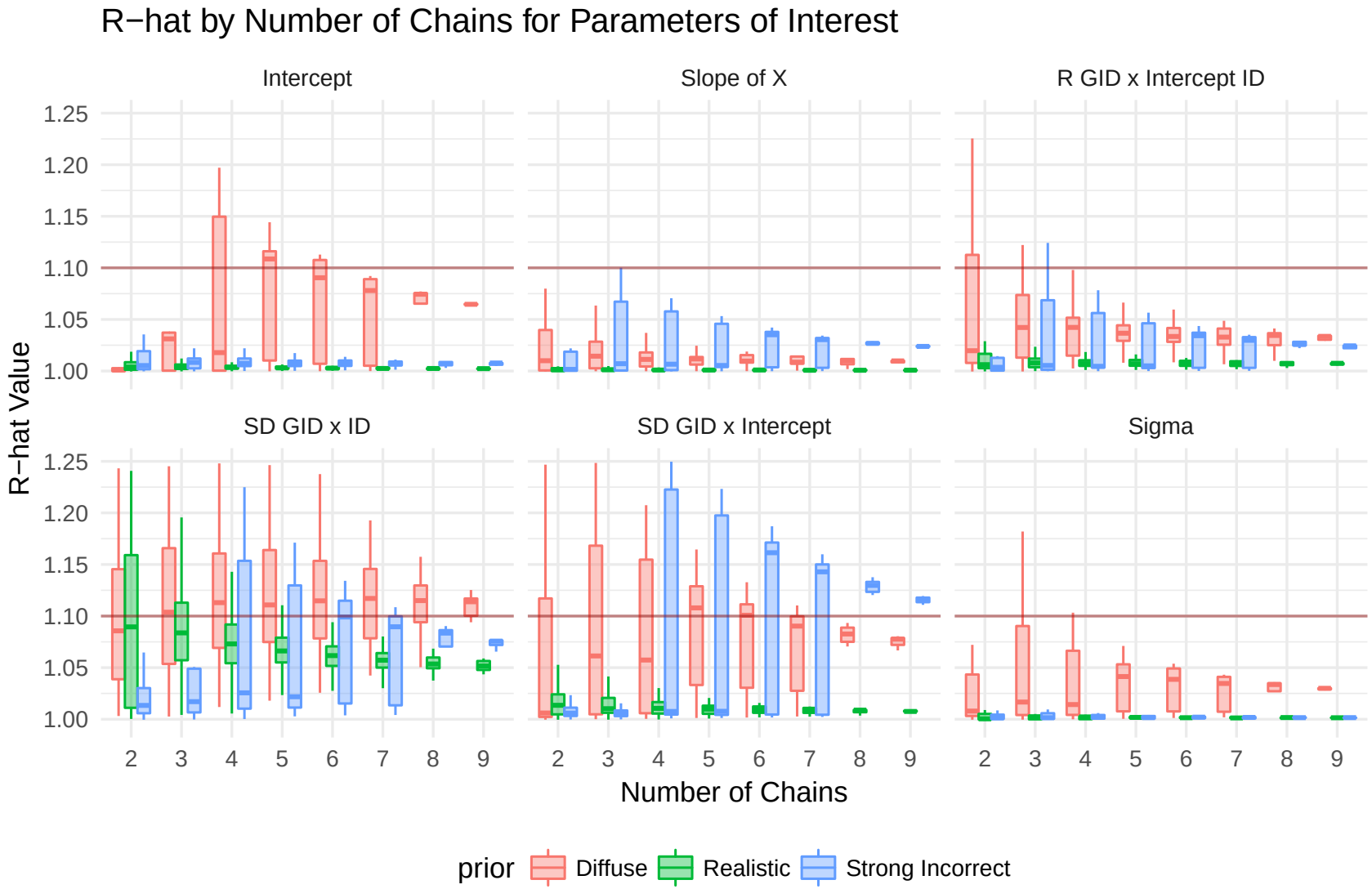
Results and Convergence: Strong and Incorrect



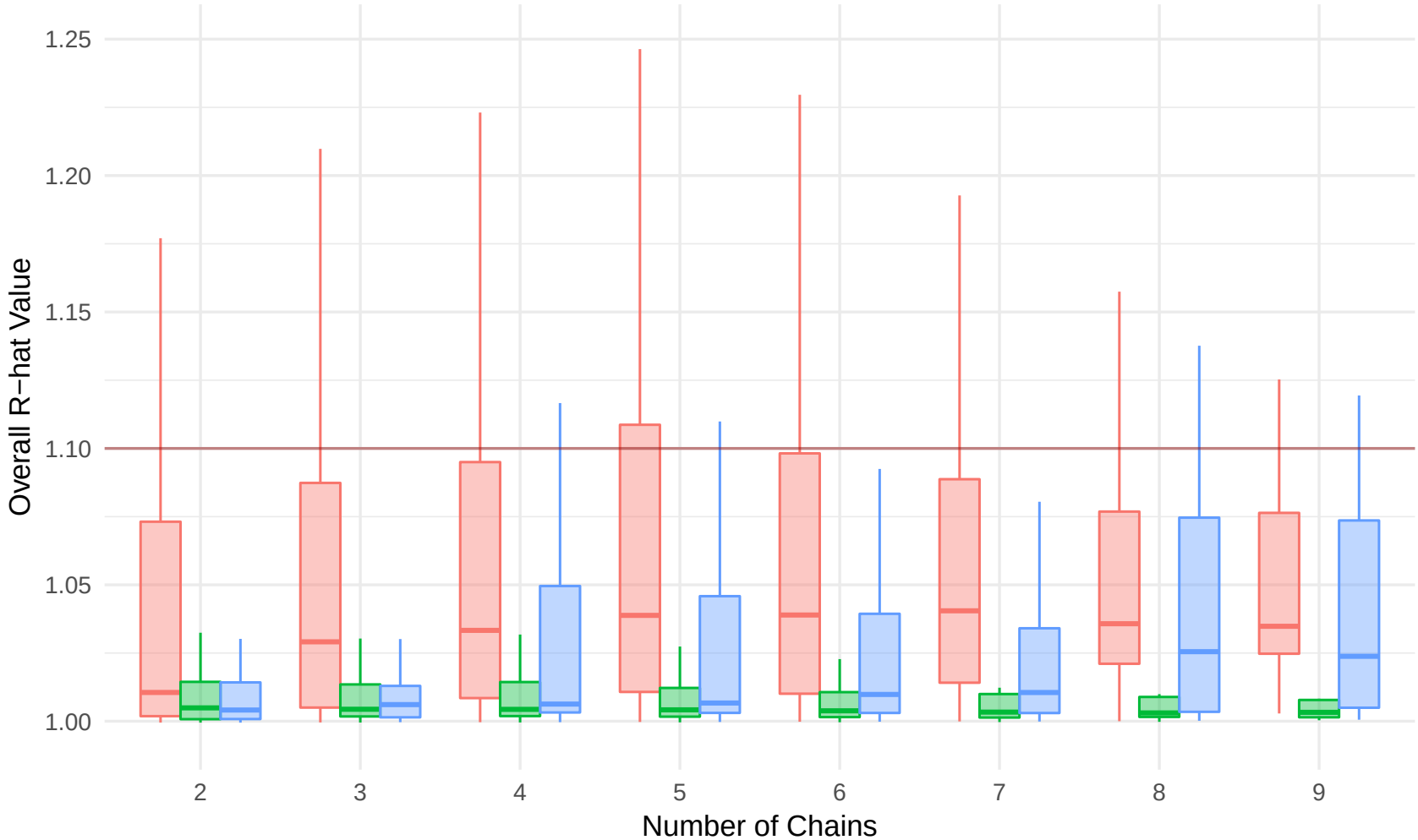
Sampling of Chains

- Chains sampled without replacement
- 2 through 9 chain conditions
- 1,000 itterations of sampling per chain
- Total Number of Conditions: 8*3 = 24

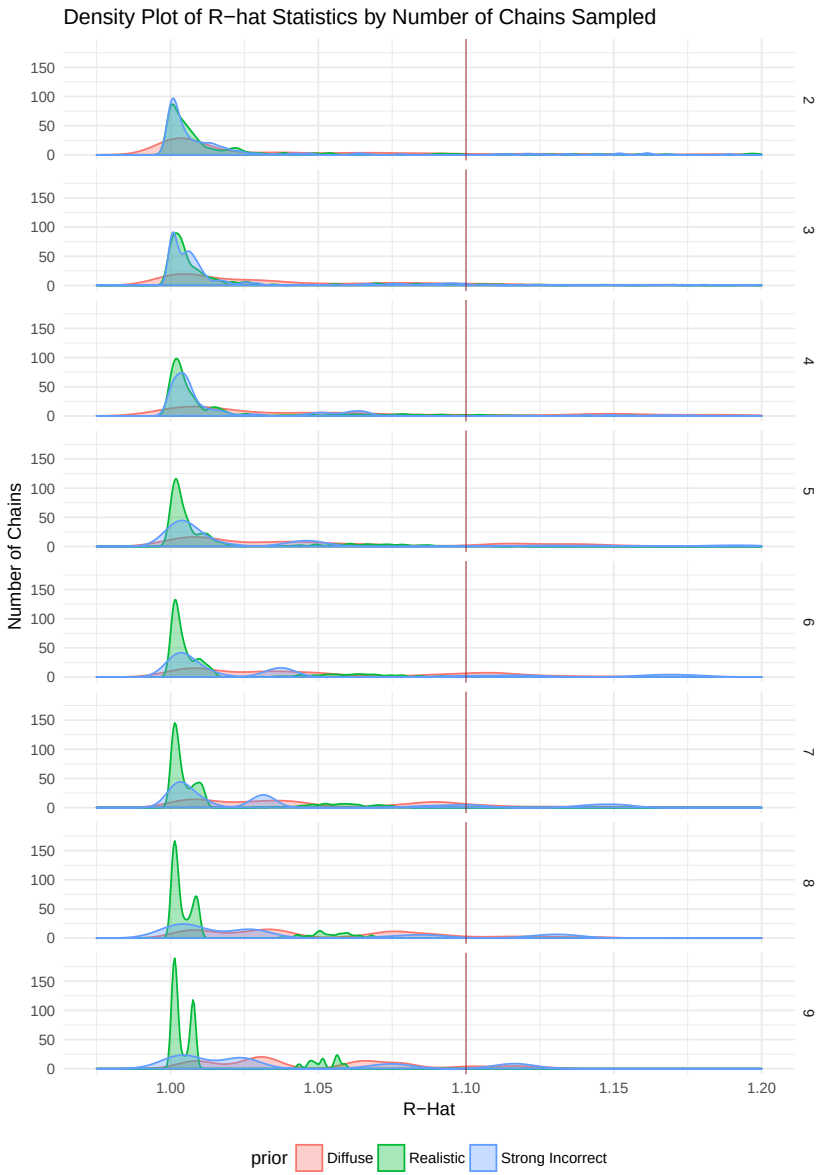
Convergence

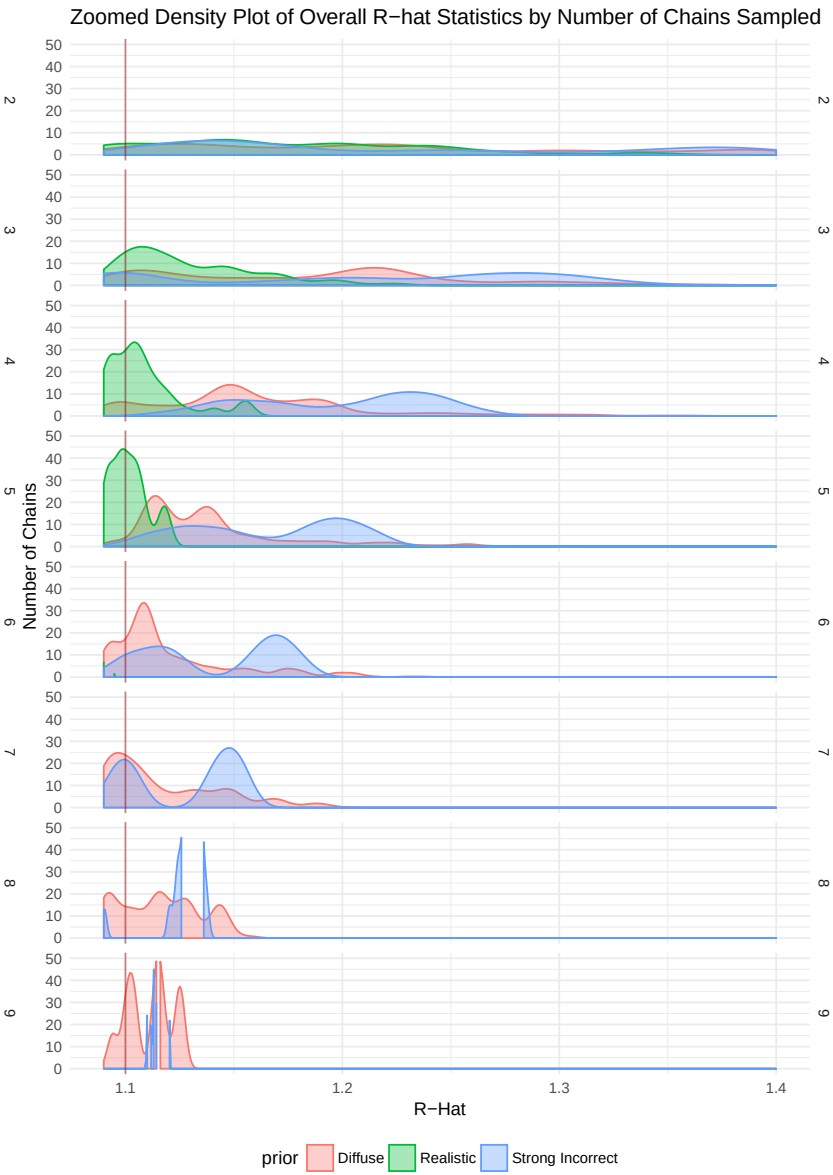


Convergence

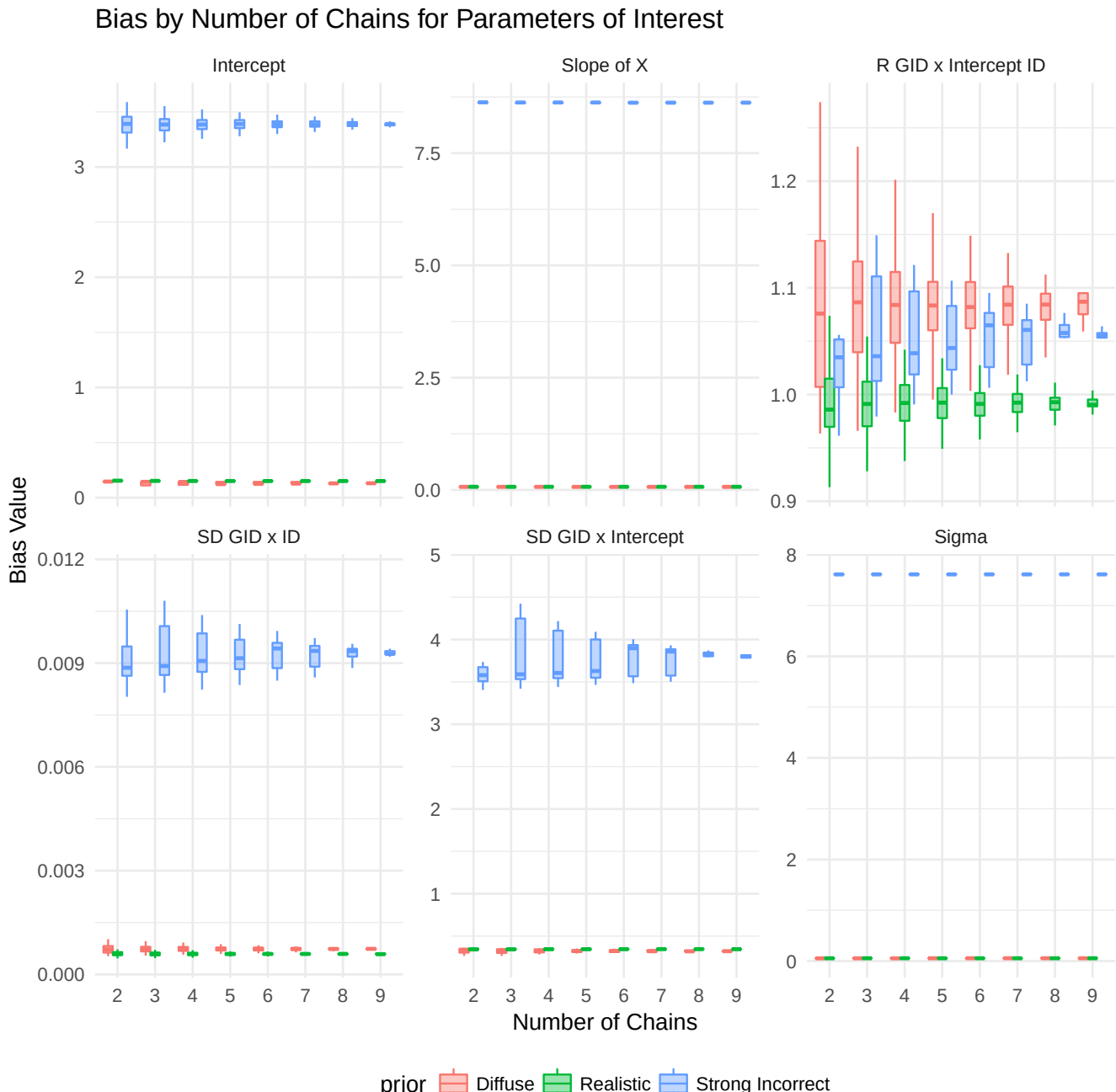


Convergence

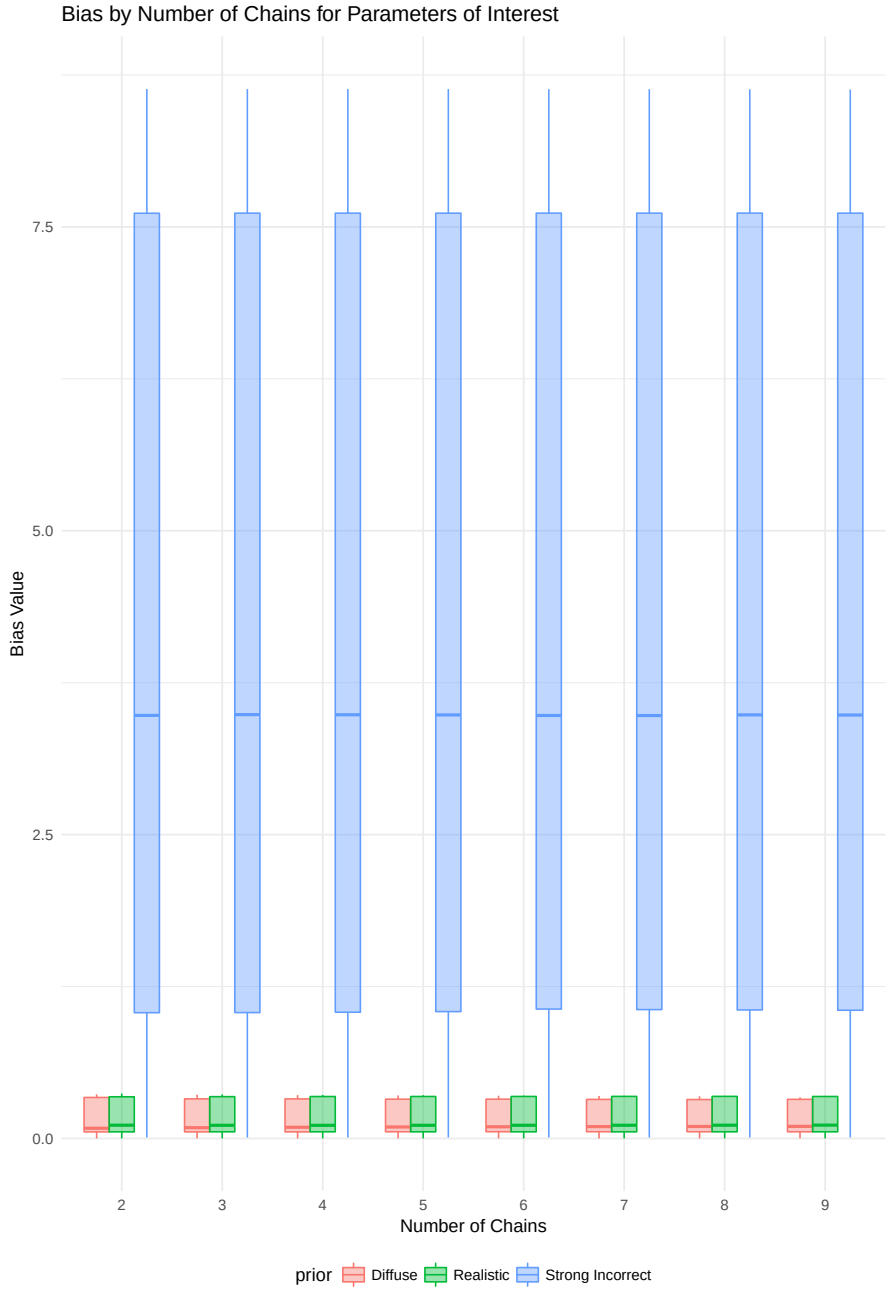




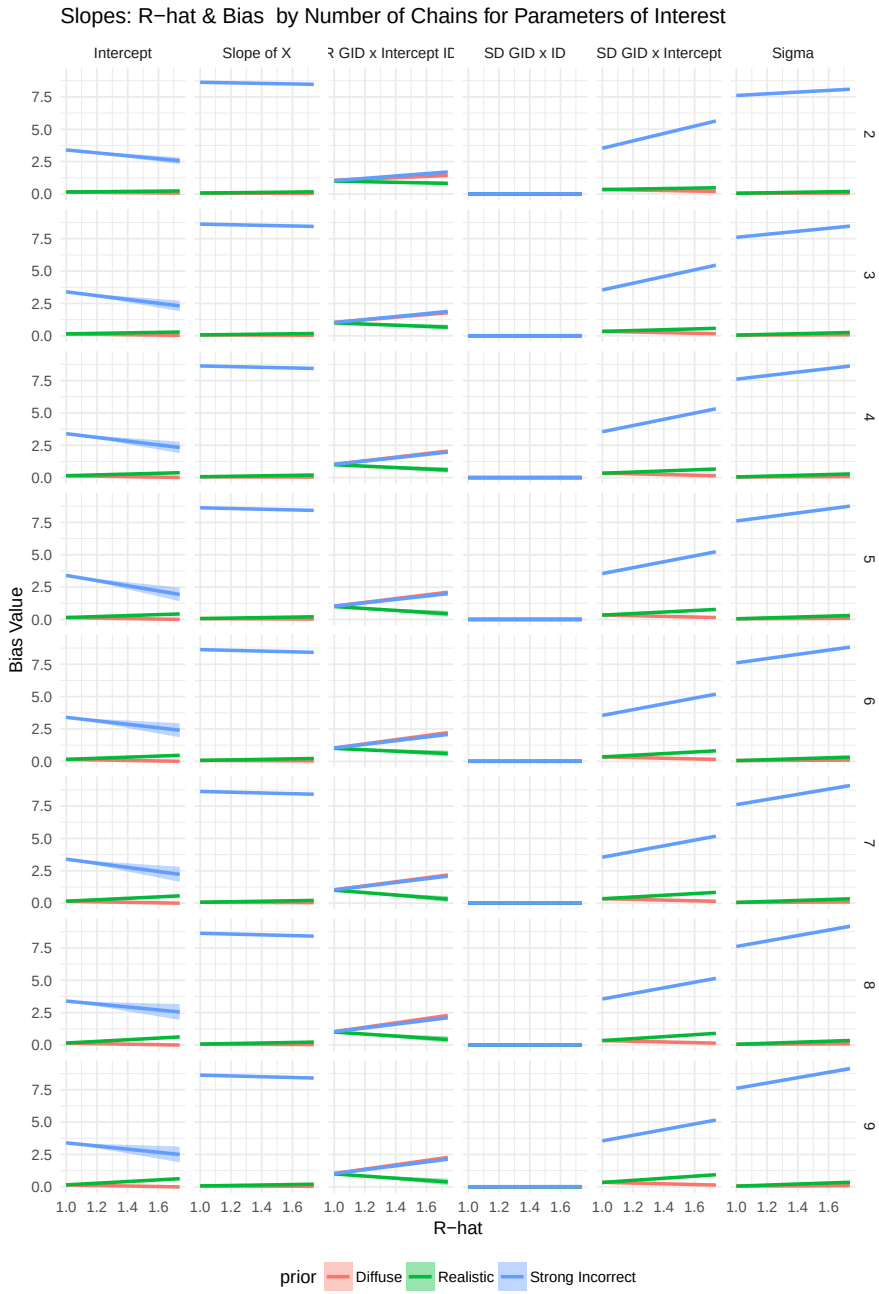
Bias


Bias by Number of Chains for Parameters of Interest
Intercept
Slope of X
R GID x Intercept ID
SD GID x ID
SD GID x Intercept
Sigma
Bias Value
Number of Chains
prior
Diffuse
Realistic
Strong Incorrect

Bias


Bias by Number of Chains for Parameters of Interest
Bias Value
7.5
5.0
2.5
0.0
2
3
4
5
6
7
8
9
Number of Chains
prior
Diffuse
Realistic
Strong Incorrect

Relationship: Convergence and Bias



Relationship: Convergence and Bias

Parameter	Prior Condition	Correlation
SD GID x ID	Diffuse	0.36
SD GID x Intercept	Diffuse	-0.861
Sigma	Diffuse	0.746
Intercept	Diffuse	-0.905
Slope of X	Diffuse	-0.278
R GID x Intercept ID	Diffuse	0.491
SD GID x ID	Realistic	-0.144
SD GID x Intercept	Realistic	0.412
Sigma	Realistic	0.735
Intercept	Realistic	0.311
Slope of X	Realistic	0.294
R GID x Intercept ID	Realistic	-0.096
SD GID x ID	Strong Incorrect	0.834
SD GID x Intercept	Strong Incorrect	0.966
Sigma	Strong Incorrect	0.502
Intercept	Strong Incorrect	-0.16
Slope of X	Strong Incorrect	-0.908
R GID x Intercept ID	Strong Incorrect	0.851