

Crossover in Parametric Fuzzing: Supplemental Figures and Tables

1 Heritability

Link	0.633	0.667	Link	0.643	0.689	Link	0.659	0.684	Link	0.584	0.616	Link	0.644	0.643	Link	0.624	0.639	Link	0.670	0.677
8.18 E-25	1PT	0.534	1.38 E-28	1PT	0.551	7.15 E-35	1PT	0.522	8.11 E-11	1PT	0.528	6.11 E-29	1PT	0.501	1.06 E-21	1PT	0.517	1.23 E-39	1PT	0.501
3.45 E-38	8.94 E-03	2PT	1.43 E-48	7.00 E-05	2PT	2.91 E-46	9.42 E-02	2PT	2.95 E-19	3.30 E-02	2PT	1.57 E-28	9.33 E-01	2PT	3.50 E-27	1.79 E-01	2PT	1.41 E-42	9.31 E-01	2PT
Ant			BCEL			Closure			Maven			Nashorn			Rhino			Tomcat		

(a) **Pairwise Inheritance Rates.** Mann-Whitney U test two-tailed p-values are placed in the entries below the main diagonal. Vargha-Delaney \hat{A}_{12} effect sizes are placed in the entries above the main diagonal.

Link	1.506	1.314	Link	0.203	0.127	Link	1.475	1.163	Link	1.188	1.213	Link	1.357	1.139	Link	1.051	0.872	Link	0.882	0.973
6.14 E-06	1PT	0.873	3.21 E-65	1PT	0.627	9.10 E-05	1PT	0.789	6.36 E-02	1PT	1.021	9.18 E-04	1PT	0.839	6.15 E-01	1PT	0.829	2.01 E-01	1PT	1.103
2.68 E-03	1.40 E-01	2PT	4.74 E-103	2.88 E-06	2PT	1.45 E-01	1.59 E-02	2PT	3.73 E-02	8.55 E-01	2PT	1.70 E-01	5.78 E-02	2PT	1.52 E-01	4.75 E-02	2PT	8.11 E-01	3.21 E-01	2PT
Ant			BCEL			Closure			Maven			Nashorn			Rhino			Tomcat		

(b) **Pairwise Hybrid Proportions.** Fisher's exact test two-tailed p-values are placed in the entries below the main diagonal. Odds ratios are placed in the entries above the main diagonal. Each reported odds ratio is the ratio of the higher odds to the lower odds for the compared pair.

Figure 1: Pairwise comparisons of heritability metrics of for one-point (1PT), two-point (2PT), and linked (Link) crossover. The main diagonal of each matrix consists of the crossover operators. Each matrix entry not on the main diagonal at some row r and column c compares the crossover operator in row r to the crossover operator in column c . Statistically significant p-values are colored blue. Larger effect sizes are colored darker shades of red.

2 Coverage

Table 1: **Pairwise Branch Coverage.** Pairwise comparisons of branch coverage per subject on long (three hour) and short (five minute) campaigns for BEDIV-SIMPLE (BD-SIMPLE), BEDIV-STRUCT (BD-STRUCT), RLCHECK, ZEST, ZEUGMA-X, ZEUGMA-1PT, ZEUGMA-2PT, and ZEUGMA-LINK. The main diagonal of each matrix consists of the fuzzers. Each matrix entry not on the main diagonal at some row r and column c compares the fuzzer in row r to the fuzzer in column c . Mann-Whitney U test two-tailed p-values are placed in the entries below the main diagonal. Vargha-Delaney \hat{A}_{12} effect sizes are placed in the entries above the main diagonal. Statistically significant p-values are colored blue. Larger effect sizes are colored darker shades of red.

Table 2: Ant After 5 Minutes.

BD-SIMPLE	0.718	0.627	0.909	0.927	0.914	0.965	0.949
1.93E-02 BD-STRUCT	0.900	0.858	0.863	0.869	0.907	0.896	
1.69E-01	1.43E-05	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.02E-05	1.14E-04	5.60E-08	ZEST	0.559	0.550	0.756	0.698
3.96E-06	9.24E-05	5.68E-08	5.33E-01	ZEUGMA-1PT	0.530	0.748	0.656
8.04E-06	6.97E-05	5.68E-08	5.97E-01	7.56E-01	ZEUGMA-2PT	0.774	0.696
5.23E-07	1.10E-05	5.70E-08	5.75E-03	7.69E-03	3.18E-03	ZEUGMA-LINK	0.603
1.28E-06	1.91E-05	5.68E-08	3.36E-02	9.32E-02	3.47E-02	2.73E-01	ZEUGMA-X

Table 4: BCEL After 5 Minutes.

BD-SIMPLE	0.557	0.647	0.610	0.555	0.785	0.674
5.43E-01 BD-STRUCT	0.677	0.666	0.605	0.820	0.722	
1.14E-01	5.65E-02	ZEST	0.557	0.646	0.640	0.537
2.39E-01	7.42E-02	5.43E-01	ZEUGMA-1PT	0.626	0.732	0.500
5.61E-01	2.62E-01	1.17E-01	1.76E-01	ZEUGMA-2PT	0.904	0.583
2.14E-03	5.63E-04	1.33E-01	1.23E-02	1.33E-05	ZEUGMA-LINK	0.770
6.20E-02	1.67E-02	6.95E-01	1.00E+00	3.79E-01	3.63E-03	ZEUGMA-X

Table 6: Closure After 5 Minutes.

BD-SIMPLE	0.541	0.995	0.922	1.000	1.000	1.000	1.000
6.65E-01 BD-STRUCT	1.000	0.932	1.000	1.000	1.000	1.000	1.000
9.16E-08	6.79E-08	RLCHECK	1.000	1.000	1.000	1.000	1.000
5.17E-06	3.07E-06	6.79E-08	ZEST	0.965	0.948	0.985	0.968
6.79E-06	6.79E-06	6.78E-08	5.22E-07	ZEUGMA-1PT	0.552	0.804	0.560
6.78E-08	6.78E-08	6.77E-08	1.37E-06	5.79E-01	ZEUGMA-2PT	0.845	0.586
6.80E-08	6.80E-08	6.79E-08	1.66E-07	1.06E-03	1.99E-04	ZEUGMA-LINK	0.738
6.78E-08	6.78E-08	6.77E-08	4.53E-07	5.25E-01	3.58E-01	1.06E-02	ZEUGMA-X

Table 8: Maven After 5 Minutes.

BD-SIMPLE	0.724	0.938	1.000	1.000	1.000	1.000	1.000
1.60E-02 BD-STRUCT	0.502	1.000	1.000	1.000	1.000	1.000	1.000
1.71E-06	9.89E-01	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.72E-08	6.77E-08	4.54E-08	ZEST	0.968	0.720	1.000	0.993
6.72E-08	6.77E-08	4.54E-08	4.53E-07	ZEUGMA-1PT	0.921	0.751	0.619
6.71E-08	6.76E-08	4.54E-08	1.79E-02	5.49E-06	ZEUGMA-2PT	0.968	0.948
6.72E-08	6.77E-08	4.54E-08	6.78E-08	6.82E-03	4.51E-07	ZEUGMA-LINK	0.694
6.68E-08	6.73E-08	4.52E-08	1.06E-07	2.03E-01	1.36E-06	3.72E-02	ZEUGMA-X

Table 10: Nashorn After 5 Minutes.

BD-SIMPLE	0.569	1.000	1.000	1.000	1.000	1.000	1.000
4.65E-01 BD-STRUCT	1.000	1.000	0.959	0.950	0.995	0.968	
8.01E-09	7.99E-09	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.79E-08	6.78E-08	7.99E-09	ZEST	1.000	1.000	1.000	1.000
6.80E-08	7.40E-07	8.01E-09	6.79E-08	ZEUGMA-1PT	0.733	0.943	0.617
6.79E-08	1.20E-06	7.99E-09	6.78E-08	1.23E-02	ZEUGMA-2PT	0.973	0.805
6.80E-08	9.16E-08	8.01E-09	6.79E-08	1.80E-06	3.41E-07	ZEUGMA-LINK	0.907
6.79E-08	4.53E-07	7.99E-09	6.78E-08	2.08E-01	1.01E-03	1.10E-05	ZEUGMA-X

Table 12: Rhino After 5 Minutes.

BD-SIMPLE	0.738	1.000	0.935	0.995	0.950	1.000	0.990
1.06E-02 BD-STRUCT	1.000	0.975	1.000	0.986	1.000	1.000	1.000
4.89E-08	4.90E-08	RLCHECK	1.000	1.000	1.000	1.000	1.000
2.68E-06	2.94E-07	4.87E-08	ZEST	0.945	0.664	1.000	0.848
9.15E-08	6.79E-08	4.89E-08	1.57E-06	ZEUGMA-1PT	0.796	0.932	0.547
1.20E-06	1.53E-07	4.89E-08	7.86E-02	1.41E-03	ZEUGMA-2PT	0.980	0.716
6.77E-08	6.78E-08	4.89E-08	6.74E-08	3.05E-06	2.21E-07	ZEUGMA-LINK	0.945
1.23E-07	6.78E-08	4.89E-08	1.79E-04	6.17E-01	2.00E-02	1.57E-06	ZEUGMA-X

Table 14: Tomcat After 5 Minutes.

BD-SIMPLE	1.000	0.914	0.849	0.850	0.861	0.896	0.884
6.19E-08 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
5.29E-06	3.81E-08	RLCHECK	0.666	0.627	0.650	0.589	0.552
1.67E-04	6.23E-08	6.73E-02	ZEST	0.517	0.557	0.559	0.561
1.57E-04	6.14E-08	1.62E-01	8.60E-01	ZEUGMA-1PT	0.530	0.569	0.580
9.66E-05	6.26E-08	1.02E-01	5.42E-01	7.55E-01	ZEUGMA-2PT	0.614	0.605
1.87E-05	6.14E-08	3.35E-01	5.33E-01	4.64E-01	2.23E-01	ZEUGMA-LINK	0.521
3.43E-05	6.26E-08	5.71E-01	5.16E-01	3.93E-01	2.61E-01	8.28E-01	ZEUGMA-X

Table 3: Ant After 3 Hours.

BD-SIMPLE	0.704	0.996	0.968	0.764	0.818	0.823	0.834
2.80E-02 BD-STRUCT	0.912	0.998	0.912	0.931	0.939	0.934	
6.11E-08	6.70E-06	RLCHECK	1.000	1.000	1.000	1.000	1.000
4.06E-07	7.04E-08	4.46E-08	ZEST	0.943	0.875	0.896	0.861
4.45E-03	8.28E-06	4.83E-08	1.65E-06	ZEUGMA-1PT	0.574	0.583	0.601
6.10E-04	3.17E-06	4.84E-08	4.95E-05	4.31E-01	ZEUGMA-2PT	0.525	0.536
4.97E-04	2.14E-06	4.85E-08	1.76E-05	3.78E-01	7.97E-01	ZEUGMA-LINK	0.565
3.17E-04	2.78E-06	4.85E-08	9.13E-05	2.78E-01	7.04E-01	4.89E-01	ZEUGMA-X

Table 5: BCEL After 3 Hours.

BD-SIMPLE	0.807	1.000	1.000	1.000	1.000	1.000
9.18E-04 BD-STRUCT	0.941	0.985	0.979	1.000	0.994	
6.74E-08	1.92E-06	ZEST	0.591	0.585	1.000	0.779
6.66E-08	1.63E-07	3.29E-01	ZEUGMA-1PT	0.537	0.999	0.764
6.73E-08	2.37E-07	3.64E-01	6.94E-01	ZEUGMA-2PT	1.000	0.776
6.62E-08	6.63E-08	6.62E-08	7.04E-08	6.61E-08	ZEUGMA-LINK	0.989
6.72E-08	9.79E-08	2.65E-03	4.47E-03	2.90E-03	1.29E-07	ZEUGMA-X

Table 7: Closure After 3 Hours.

BD-SIMPLE	0.575	1.000	1.000	0.887	0.789	1.000	0.953
4.25E-01 BD-STRUCT	1.000	0.995	0.871	0.816	1.000	0.938	
6.80E-08	6.80E-08	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.79E-08	9.16E-08	6.79E-08	ZEST	0.946	0.988	0.892	0.874
2.92E-05	6.24E-05	6.80E-08	1.47E-06	ZEUGMA-1PT	0.718	1.000	0.701
1.86E-03	6.53E-04	6.79E-08	1.43E-07	1.93E-02	ZEUGMA-2PT	1.000	0.860
6.80E-08	6.80E-08	6.80E-08	2.30E-05	6.80E-08	6.79E-08	ZEUGMA-LINK	1.000
1.05E-06	2.36E-06	6.80E-08	5.56E-05	3.05E-02	1.04E-04	6.80E-08	ZEUGMA-X

Table 9: Maven After 3 Hours.

BD-SIMPLE	0.968	0.950	1.000	1.000	1.000	1.000	1.000
4.52E-07 BD-STRUCT	0.800	1.000	1.000	1.000	1.000	1.000	1.000
2.10E-07	5.49E-04	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.76E-08	6.77E-08	7.98E-09	ZEST	1.000	0.988	1.000	1.000
3.78E-08	3.78E-08	3.73E-09	3.78E-08	ZEUGMA-1PT	0.906	0.604	0.627
6.65E-08	6.66E-08	7.82E-09	1.40E-07	6.57E-06	ZEUGMA-2PT	0.960	0.965
1.94E-08	1.94E-08	1.54E-09	1.94E-08	1.41E-01	1.81E-07	ZEUGMA-LINK	0.525
1.51E-08	1.51E-08	1.10E-09	1.51E-08	5.98E-02	1.05E-07	6.54E-01	ZEUGMA-X

Table 11: Nashorn After 3 Hours.

BD-SIMPLE	0.512	1.000	1.000	1.000	1.000	1.000	1.000
9.03E-01 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
7.98E-09	8.01E-09	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.77E-08	6.79E-08	7.99E-09	ZEST	1.000	1.000	1.000	1.000
6.77E-08	6.79E-08	7.99E-09	6.78E-08	ZEUGMA-1PT	0.715	0.953	0.705
6.78E-08	6.80E-08	8.01E-09	6.79E-08	2.07E-02	ZEUGMA-2PT	1.000	0.887
6.76E-08	6.78E-08	7.98E-09	6.77E-08	1.04E-06	6.78E-08	ZEUGMA-LINK	0.993
6.76E-08	6.78E-08	7.98E-09	6.77E-08	2.74E-02	2.92E-05	1.06E-07	ZEUGMA-X

Table 13: Rhino After 3 Hours.

BD-SIMPLE	0.575	1.000	1.000	1.000	1.000	1.000	1.000
4.24E-01 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.50E-08	1.51E-08	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.72E-08	6.76E-08	1.51E-08	ZEST	0.958	0.973	0.995	0.975
6.72E-08	6.76E-08	1.51E-08	7.93E-07	ZEUGMA-1PT	0.652	0.829	0.637
6.73E-08	6.77E-08	1.51E-08	3.41E-07	1.02E-01	ZEUGMA-2PT	0.890	0.546
6.72E-08	6.76E-08	1.51E-08	9.15E-08	3.94E-04	2.59E-05	ZEUGMA-LINK	0.895
6.73E-08	6.77E-08	1.51E-08	2.96E-07	1.40E-01	6.26E-01	2.04E-05	ZEUGMA-X

Table 15: Tomcat After 3 Hours.

BD-SIMPLE	1.000	0.824	0.501	0.752	0.512	0.782	0.805
6.48E-08 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3.21E-04	3.77E-08	RLCHECK	0.807	0.999	0.879	0.965	0.965
1.00E+00	6.62E-08	6.84E-04	ZEST	0.735	0.521	0.756	0.797
6.19E-03	6.50E-08	3.93E-08	1.09E-02	ZEUGMA-1PT	0.776	0.561	0.621
9.03E-01	6.58E-08	2.83E-05	8.28E-01	2.73E-03	ZEUGMA-2PT	0.806	0.838
2.12E-03	5.92E-08	2.78E-07	5.17E-03	5.09E-01	8.81E-04	ZEUGMA-LINK	0.585
9.19E-04	6.30E-08	2.95E-07	1.24E-03	1.89E-01	2.52E-04	3.54E-01	ZEUGMA-X

3 Defects

Table 16: **Pairwise Defect Detection Rates.** Pairwise comparisons of defect detection rates per defect on long (three hour) and short (five minute) campaigns for BeDIV-SIMPLE (BD-SIMPLE), BeDIV-STRUCT (BD-STRUCT), RLCHECK, ZEST, ZEUGMA-X, ZEUGMA-1PT, ZEUGMA-2PT, and ZEUGMA-LINK. The main diagonal of each matrix consists of the fuzzers. Each matrix entry not on the main diagonal at some row r and column c compares the fuzzer in row r to the fuzzer in column c . Fisher’s exact test two-tailed p-values are placed in the entries below the main diagonal. Odds ratios are placed in the entries above the main diagonal. Each reported odds ratio is the ratio of the higher odds to the lower odds for the compared pair. Statistically significant p-values are colored blue. Larger effect sizes are colored darker shades of red.

Table 17: B0 After 5 Minutes.

BD-SIMPLE	0.317	1.000	1.000	0.069	0.069	0.317
1.00E+00	BD-STRUCT	3.154	3.154	0.158	0.158	1.000
1.00E+00	1.00E+00	ZEST	1.000	0.069	0.069	0.317
1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	0.069	0.069	0.317
4.71E-02	1.82E-01	4.71E-02	4.71E-02	ZEUGMA-2PT	1.000	6.333
4.71E-02	1.82E-01	4.71E-02	4.71E-02	1.00E+00	ZEUGMA-LINK	6.333
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.82E-01	1.82E-01	ZEUGMA-X

Table 19: B1 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	BD-STRUCT	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	ZEST	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 21: C0 After 5 Minutes.

[illegible]

Table 23: C1 After 5 Minutes.

BD-SIMPLE	8.200	0.706	1.588	0.176	0.044	0.118	0.118
2.31E-01	BD-STRUCT	0.089	0.180	0.024	0.007	0.017	0.017
1.00E+00	1.06E-01	RLCHECK	2.250	0.250	0.062	0.167	0.167
1.00E+00	4.87E-01	6.61E-01	ZEST	0.111	0.028	0.074	0.074
4.07E-02	4.36E-04	9.58E-02	1.38E-02	ZEUGMA-1PT	0.250	0.667	0.667
8.75E-05	1.54E-07	3.60E-04	1.66E-05	9.58E-02	ZEUGMA-2PT	2.667	2.667
7.91E-03	4.51E-05	2.25E-02	2.20E-03	7.51E-01	3.01E-01	ZEUGMA-LINK	1.000
7.91E-03	4.51E-05	2.25E-02	2.20E-03	7.51E-01	3.01E-01	1.00E+00	ZEUGMA-X

Table 25: N0 After 5 Minutes.

BD-SIMPLE	1.000		1.000		1.000		1.000		0.317	1.000
1.00E+00	BD-STRUCT		1.000		1.000		1.000		0.317	1.000
1.00E+00	1.00E+00	RLCHECK	1.000		1.000		1.000		0.317	1.000
1.00E+00	1.00E+00	1.00E+00	ZEST		1.000		1.000		0.317	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000		1.000		0.317	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT		0.317		1.000	
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK		3.154		
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X			

Table 27: N1 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 RLCHECK	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00 ZEST	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00 1.00E+00 ZEUGMA-1PT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 ZEUGMA-2PT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 ZEUGMA-LINK	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 ZEUGMA-X	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 29: N2 After 5 Minutes.

[illegible]

Table 18: B0 After 3 Hours.

BD-SIMPLE	0.796	0.044	0.044	0.044	0.044	0.044
1.00E+00	BD-STRUCT	0.054	0.054	0.054	0.054	0.054
8.32E-03	2.02E-02	ZEST	1.000	1.000	1.000	1.000
8.32E-03	2.02E-02	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
8.32E-03	2.02E-02	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
8.32E-03	2.02E-02	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
8.32E-03	2.02E-02	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 20: B1 After 3 Hours.

BD-SIMPLE	1.000	1.000	0.180	0.180	1.000	1.000
1.00E+00	BD-STRUCT	1.000	0.180	0.180	1.000	1.000
1.00E+00	1.00E+00	ZEST	0.180	0.180	1.000	1.000
4.87E-01	4.87E-01	4.87E-01	ZEUGMA-1PT	1.000	5.541	5.541
4.87E-01	4.87E-01	4.87E-01	1.00E+00	ZEUGMA-2PT	5.541	5.541
1.00E+00	1.00E+00	1.00E+00	4.87E-01	4.87E-01	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	4.87E-01	4.87E-01	1.00E+00	ZEUGMA-X

Table 22: C0 After 3 Hours.

BD-SIMPLE	0.298	0.474	0.079	0.079	0.079	0.028	0.158
6.05E-01	BD-STRUCT	1.588	0.265	0.265	0.265	0.095	0.529
1.00E+00	1.00E+00	RLCHECK	0.167	0.167	0.167	0.060	0.333
1.97E-02	1.55E-01	6.48E-02	ZEST	1.000	1.000	0.359	2.000
1.97E-02	1.55E-01	6.48E-02	1.00E+00	ZEUGMA-1PT	1.000	0.359	2.000
1.97E-02	1.55E-01	6.48E-02	1.00E+00	1.00E+00	ZEUGMA-2PT	0.359	2.000
1.37E-04	3.06E-03	7.72E-04	2.05E-01	2.05E-01	2.05E-01	ZEUGMA-LINK	5.571
1.82E-01	6.95E-01	4.07E-01	5.01E-01	5.01E-01	5.01E-01	2.48E-02	ZEUGMA-X

Table 24: C1 After 3 Hours.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 RLCHECK	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00 ZEST	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00 1.00E+00 ZEUGMA-1PT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 ZEUGMA-2PT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 ZEUGMA-LINK	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 ZEUGMA-X	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 26: N0 After 3 Hours.

BD-Simple	1.000	1.000	1.000	0.054	0.030	0.001	0.009
1.00E+00	BD-STRUCT	1.000	1.000	0.054	0.030	0.001	0.009
1.00E+00	1.00E+00	RLCHECK	1.000	0.054	0.030	0.001	0.009
1.00E+00	1.00E+00	1.00E+00	ZEST	0.054	0.030	0.001	0.009
2.02E-02	2.02E-02	2.02E-02	2.02E-02	ZEUGMA-1PT	0.524	0.011	0.143
1.23E-03	1.23E-03	1.23E-03	1.23E-03	5.14E-01	ZEUGMA-2PT	0.020	0.273
1.45E-11	1.45E-11	1.45E-11	1.45E-11	3.34E-06	1.45E-04	ZEUGMA-LINK	1.548
7.71E-07	7.71E-07	7.71E-07	7.71E-07	1.04E-02	1.05E-01	4.71E-02	ZEUGMA-X

Table 28: N1 After 3 Hours.

[illegible]

Table 30: N2 After 3 Hours.

BD-SIMPLE	1.000	1.000	1.000	1.000	0.317	0.024	0.317
1.00E+00	BD-STRUCT	1.000	1.000	1.000	0.317	0.024	0.317
1.00E+00	1.00E+00	RLCHECK	1.000	1.000	0.317	0.024	0.317
1.00E+00	1.00E+00	1.00E+00	ZEST	1.000	0.317	0.024	0.317
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	0.317	0.024	0.317
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	0.053	1.000
4.36E-04	4.36E-04	4.36E-04	4.36E-04	4.36E-04	3.34E-03	ZEUGMA-LINK	19.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	3.34E-03	ZEUGMA-X

Table 31: Pairwise Defect Detection Rates Continued.

Table 32: R0 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	ZEST	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 34: R1 After 5 Minutes.

BD-SIMPLE	0.211	3.154	1.000	0.474	0.474	0.474	0.298
3.42E-01	BD-STRUCT	11.182	4.750	2.250	2.250	2.250	1.417
1.00E+00	1.06E-01	RLCHECK	0.317	0.180	0.180	0.180	0.122
1.00E+00	3.42E-01	1.00E+00	ZEST	0.474	0.474	0.474	0.298
1.00E+00	6.61E-01	4.87E-01	1.00E+00	ZEUGMA-1PT	1.000	1.000	0.630
1.00E+00	6.61E-01	4.87E-01	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	0.630
1.00E+00	6.61E-01	4.87E-01	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	0.630
6.05E-01	1.00E+00	2.31E-01	6.05E-01	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 36: R2 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	ZEST	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 38: R3 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	ZEST	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 40: R4 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	ZEST	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 33: R0 After 3 Hours.

BD-SIMPLE	1.000	1.000	0.180	0.011	0.017	0.007	0.009
1.00E+00	BD-STRUCT	1.000	0.180	0.011	0.017	0.007	0.009
1.00E+00	1.00E+00	RLCHECK	0.180	0.011	0.017	0.007	0.009
4.87E-01	4.87E-01	4.87E-01	ZEST	0.048	0.074	0.028	0.037
3.34E-06	3.34E-06	3.34E-06	2.44E-04	ZEUGMA-1PT	1.556	0.583	0.778
4.51E-05	4.51E-05	4.51E-05	2.20E-03	7.41E-01	ZEUGMA-2PT	0.375	0.500
1.54E-07	1.54E-07	1.54E-07	1.66E-05	7.16E-01	3.01E-01	ZEUGMA-LINK	1.333
7.71E-07	7.71E-07	7.71E-07	6.86E-05	1.00E+00	5.01E-01	1.00E+00	ZEUGMA-X

Table 35: R1 After 3 Hours.

BD-SIMPLE	0.441	33.870	0.043	0.273	0.091	0.351	0.205
3.41E-01	BD-STRUCT	73.800	0.098	0.619	0.206	0.796	0.464
1.23E-03	1.29E-05	RLCHECK	0.002	0.009	0.003	0.011	0.007
1.25E-03	4.36E-02	3.05E-10	ZEST	6.333	2.111	8.143	4.750
1.05E-01	7.31E-01	7.71E-07	1.82E-01	ZEUGMA-1PT	0.333	1.286	0.750
5.74E-03	1.27E-01	3.35E-09	1.00E+00	4.07E-01	ZEUGMA-2PT	3.857	2.250
2.00E-01	1.00E+00	3.34E-06	9.15E-02	1.00E+00	2.35E-01	ZEUGMA-LINK	0.583
4.84E-02	4.80E-01	1.54E-07	3.42E-01	1.00E+00	6.61E-01	7.16E-01	ZEUGMA-X

Table 37: R2 After 3 Hours.

BD-SIMPLE	1.000	1.000	0.089	0.005	0.011	0.005	0.002
1.00E+00	BD-STRUCT	1.000	0.089	0.005	0.011	0.005	0.002
1.00E+00	1.00E+00	RLCHECK	0.089	0.005	0.011	0.005	0.002
1.06E-01	1.06E-01	1.06E-01	ZEST	0.044	0.107	0.044	0.013
2.57E-08	2.57E-08	2.57E-08	8.75E-05	ZEUGMA-1PT	2.429	1.000	0.298
3.34E-06	3.34E-06	3.34E-06	3.64E-03	4.51E-01	ZEUGMA-2PT	0.412	0.123
2.57E-08	2.57E-08	2.57E-08	8.75E-05	1.00E+00	4.51E-01	ZEUGMA-LINK	0.298
3.05E-10	3.05E-10	3.05E-10	2.21E-06	6.05E-01	9.15E-02	6.05E-01	ZEUGMA-X

Table 39: R3 After 3 Hours.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	ZEST	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 41: R4 After 3 Hours.

BD-SIMPLE	1.000	1.000	0.317	0.005	0.005	0.002	0.003
1.00E+00	BD-STRUCT	1.000	0.317	0.005	0.005	0.002	0.003
1.00E+00	1.00E+00	RLCHECK	0.317	0.005	0.005	0.002	0.003
1.00E+00	1.00E+00	1.00E+00	ZEST	0.009	0.009	0.003	0.006
2.57E-08	2.57E-08	2.57E-08	4.06E-07	ZEUGMA-1PT	1.000	0.298	0.630
2.57E-08	2.57E-08	2.57E-08	4.06E-07	1.00E+00	ZEUGMA-2PT	0.298	0.630
3.05E-10	3.05E-10	3.05E-10	5.82E-09	6.05E-01	6.05E-01	ZEUGMA-LINK	2.111
3.35E-09	3.35E-09	3.35E-09	5.82E-08	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X