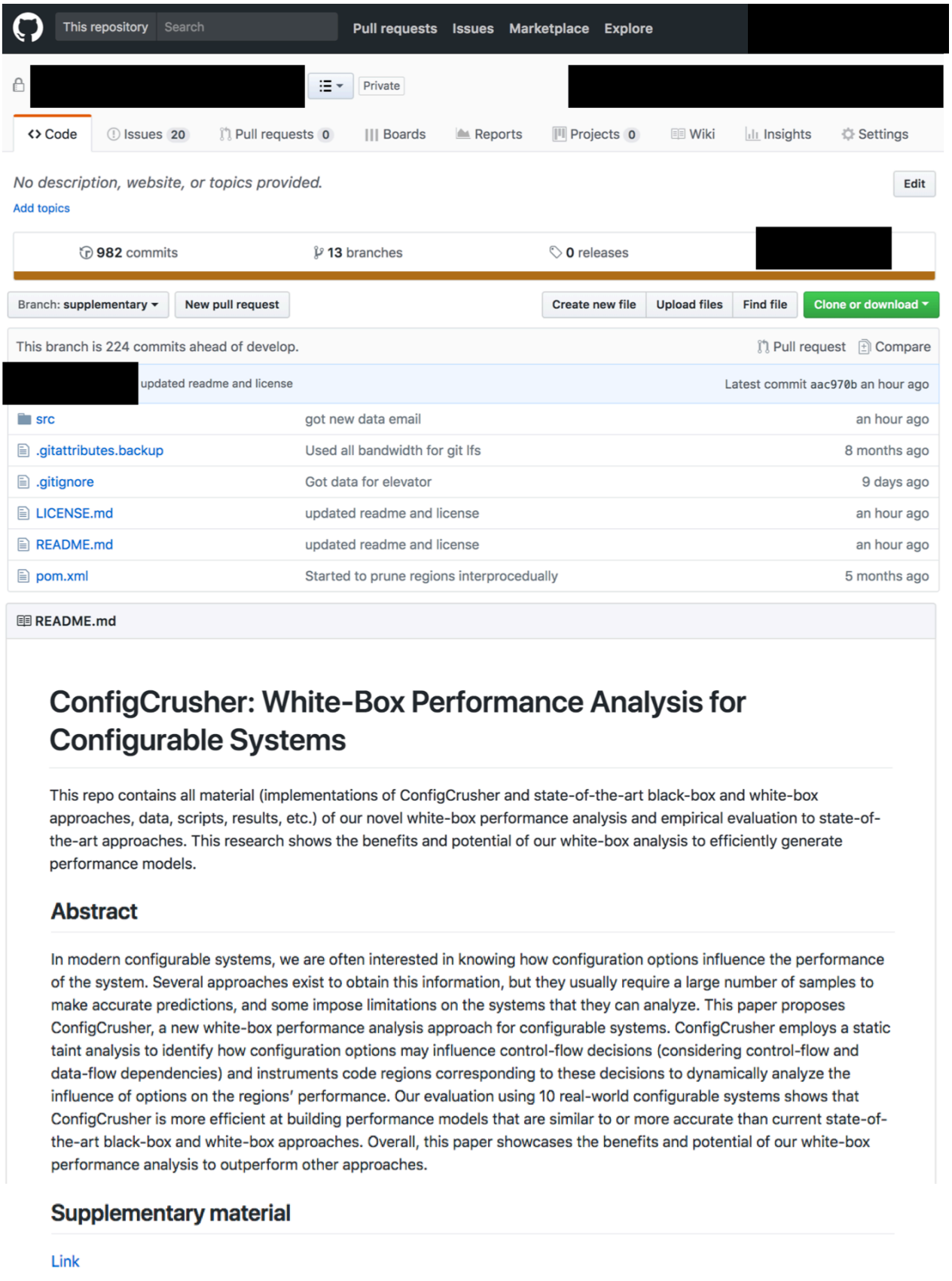
ConfigCrusher: White-Box Performance Analysis for Configurable Systems (Supplementary material)

Main repo



License

MIT License

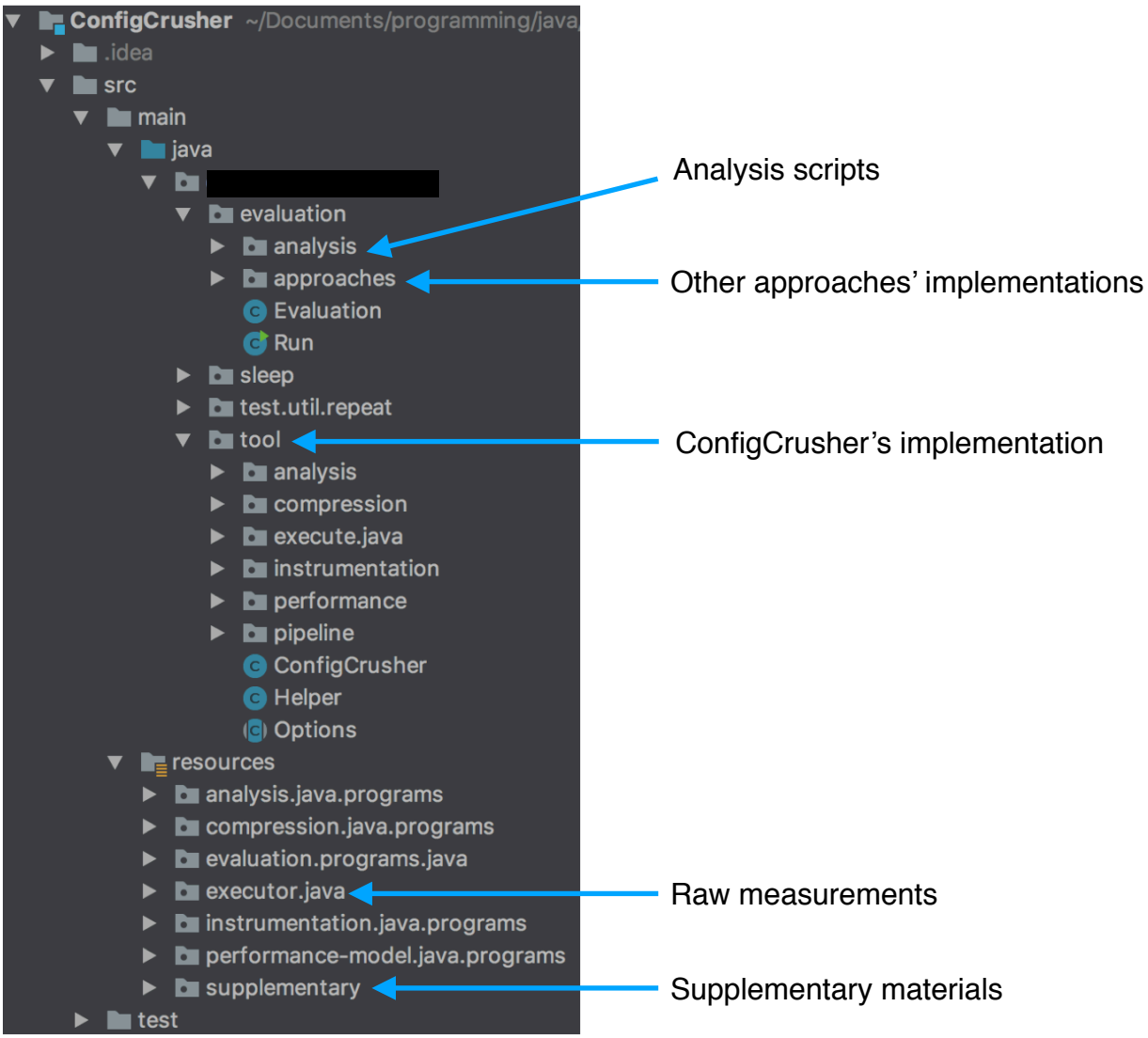
Copyright (c) 2018 [redacted]

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

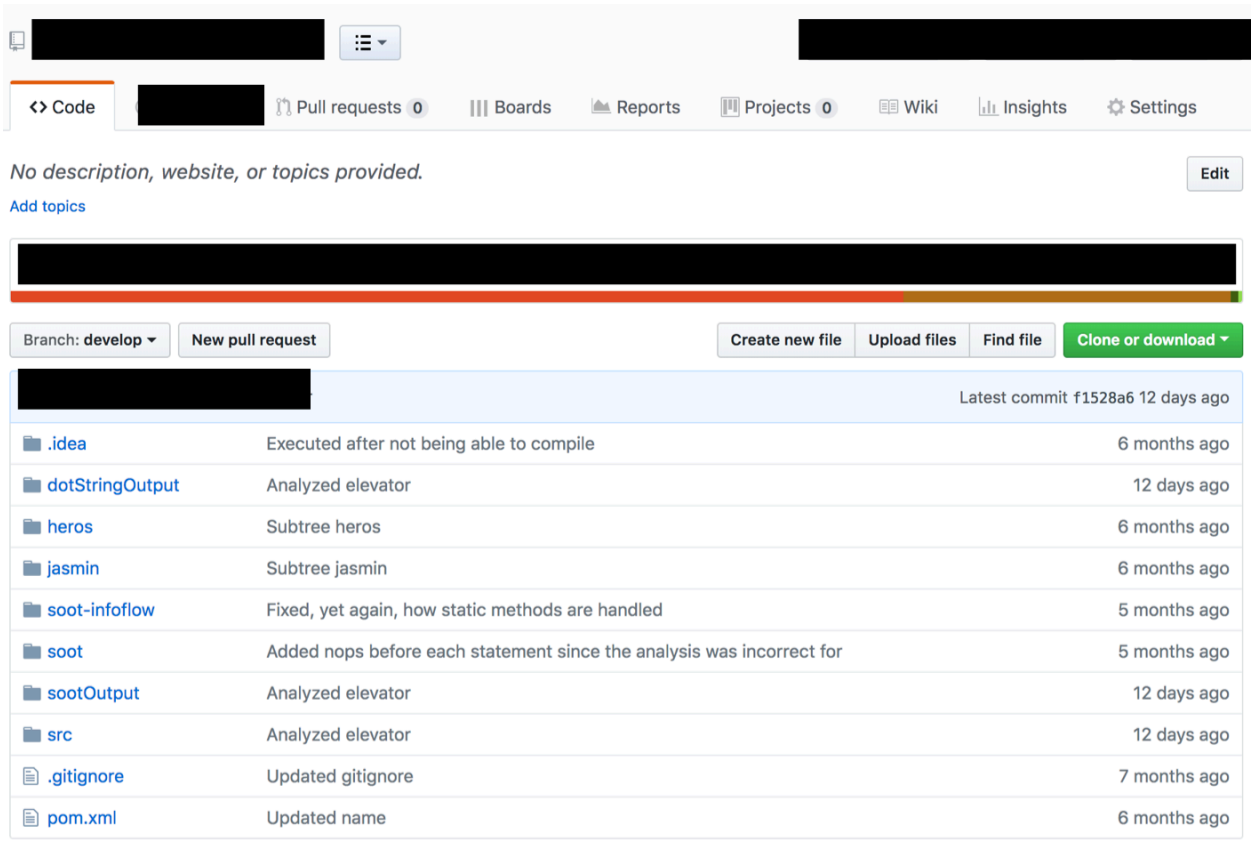
The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

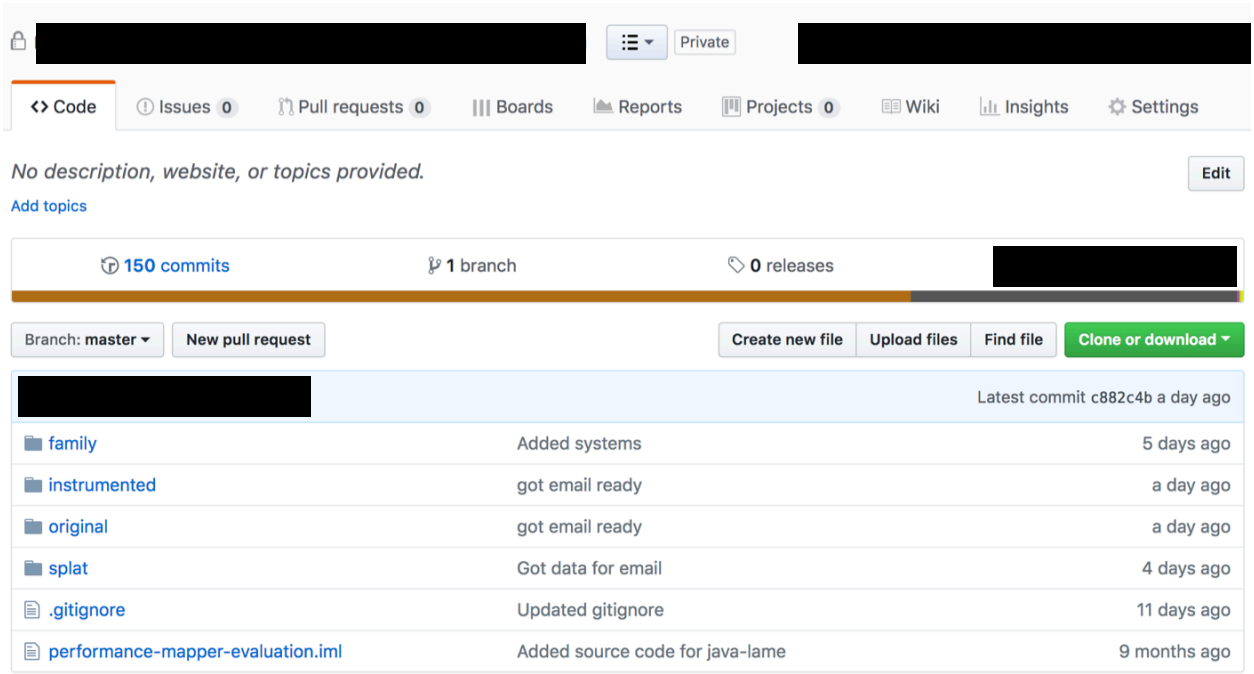
Structure



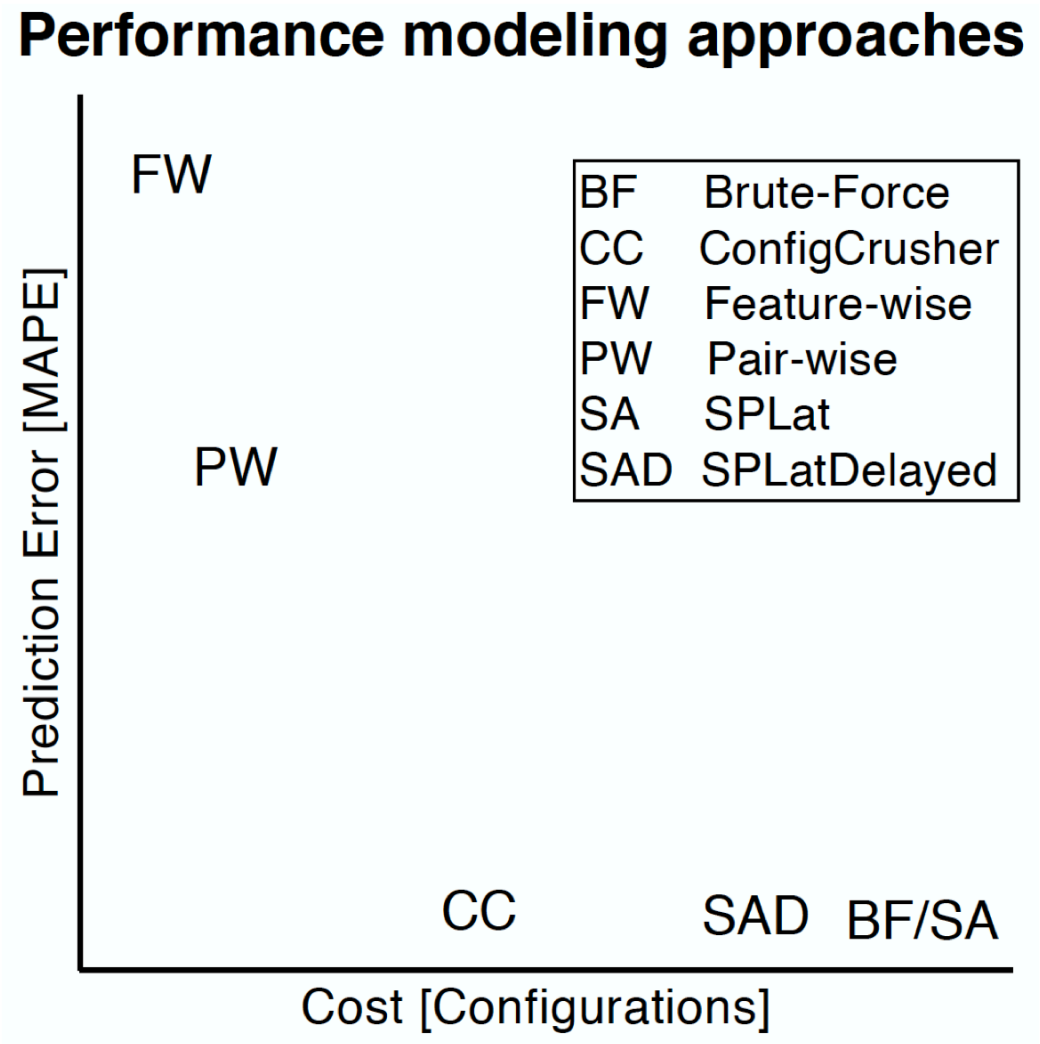
Static taint analysis repo



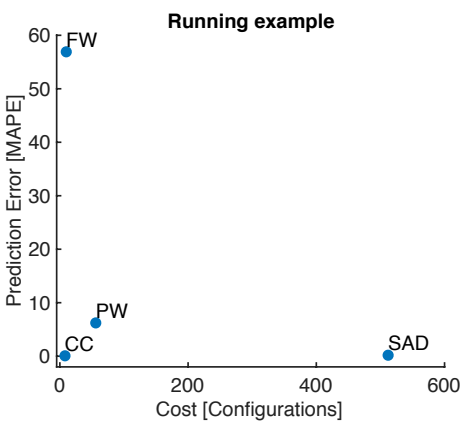
Subject systems repo

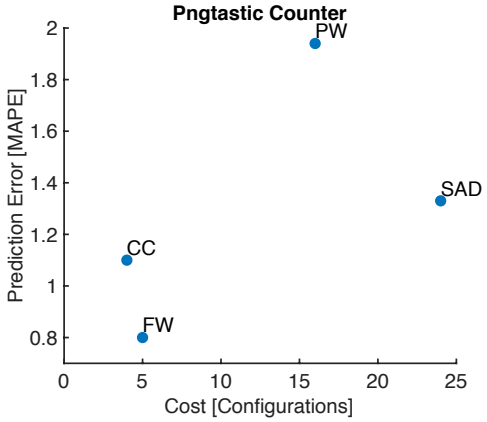


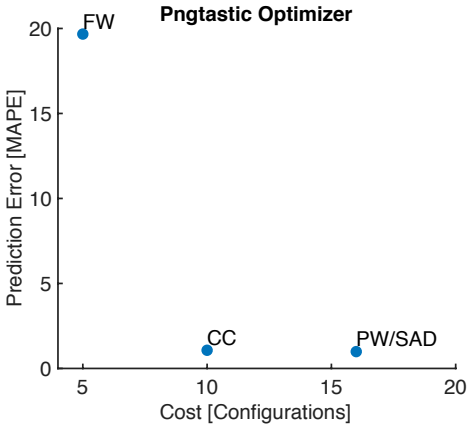
Conjecture on cost and prediction error comparison between state-of-the-art approaches

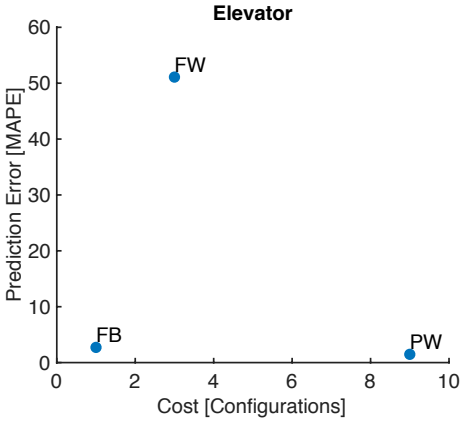


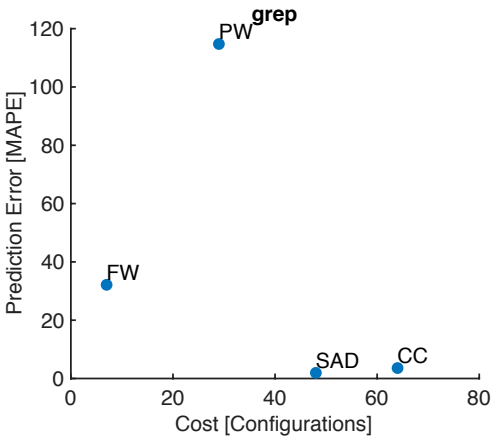
Cost vs prediction error

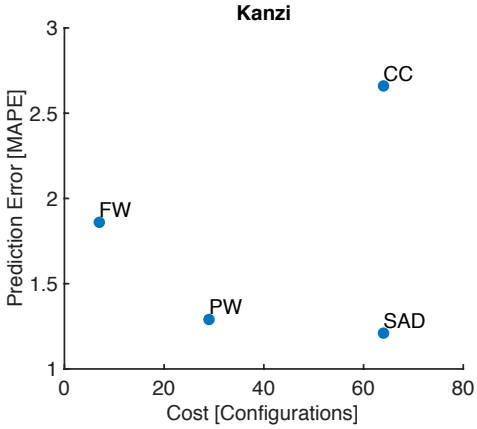


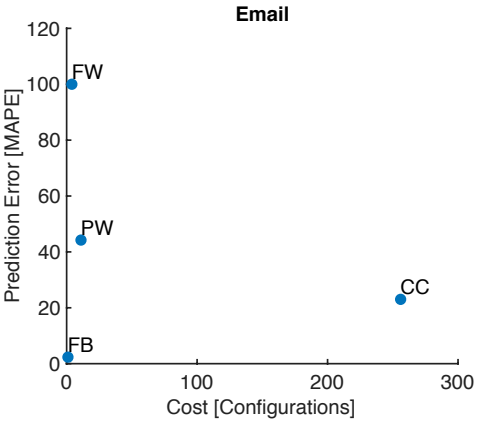


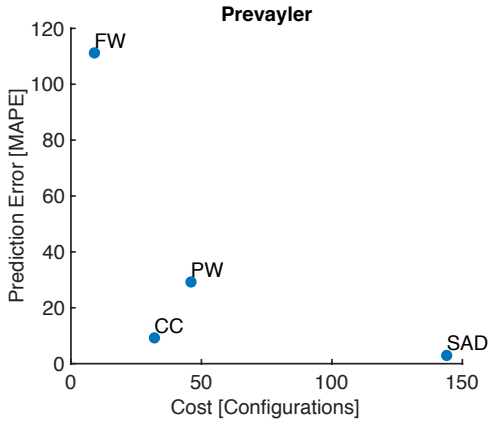


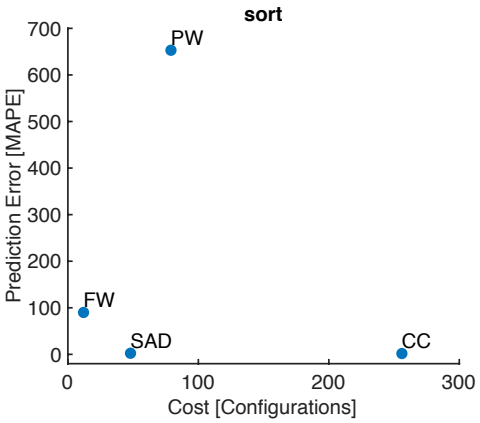


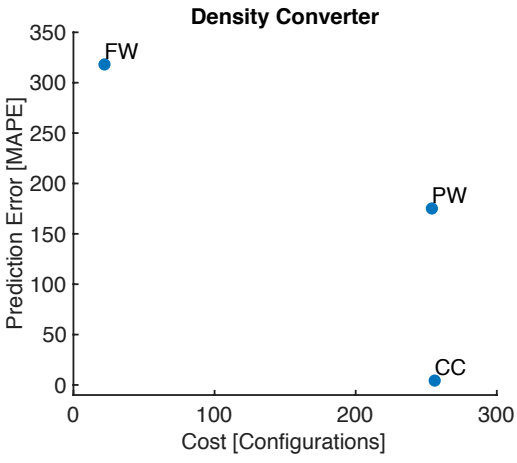




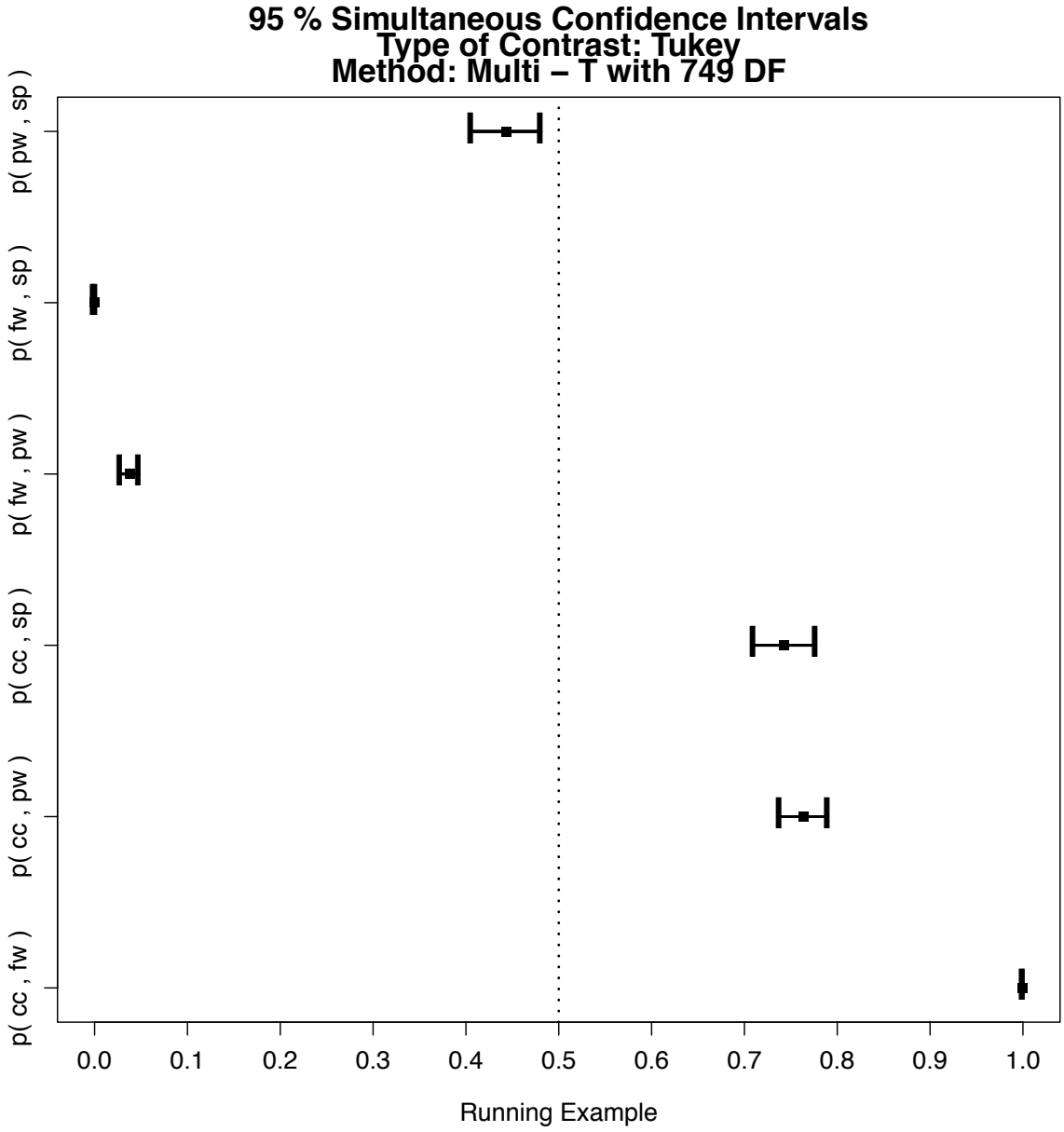


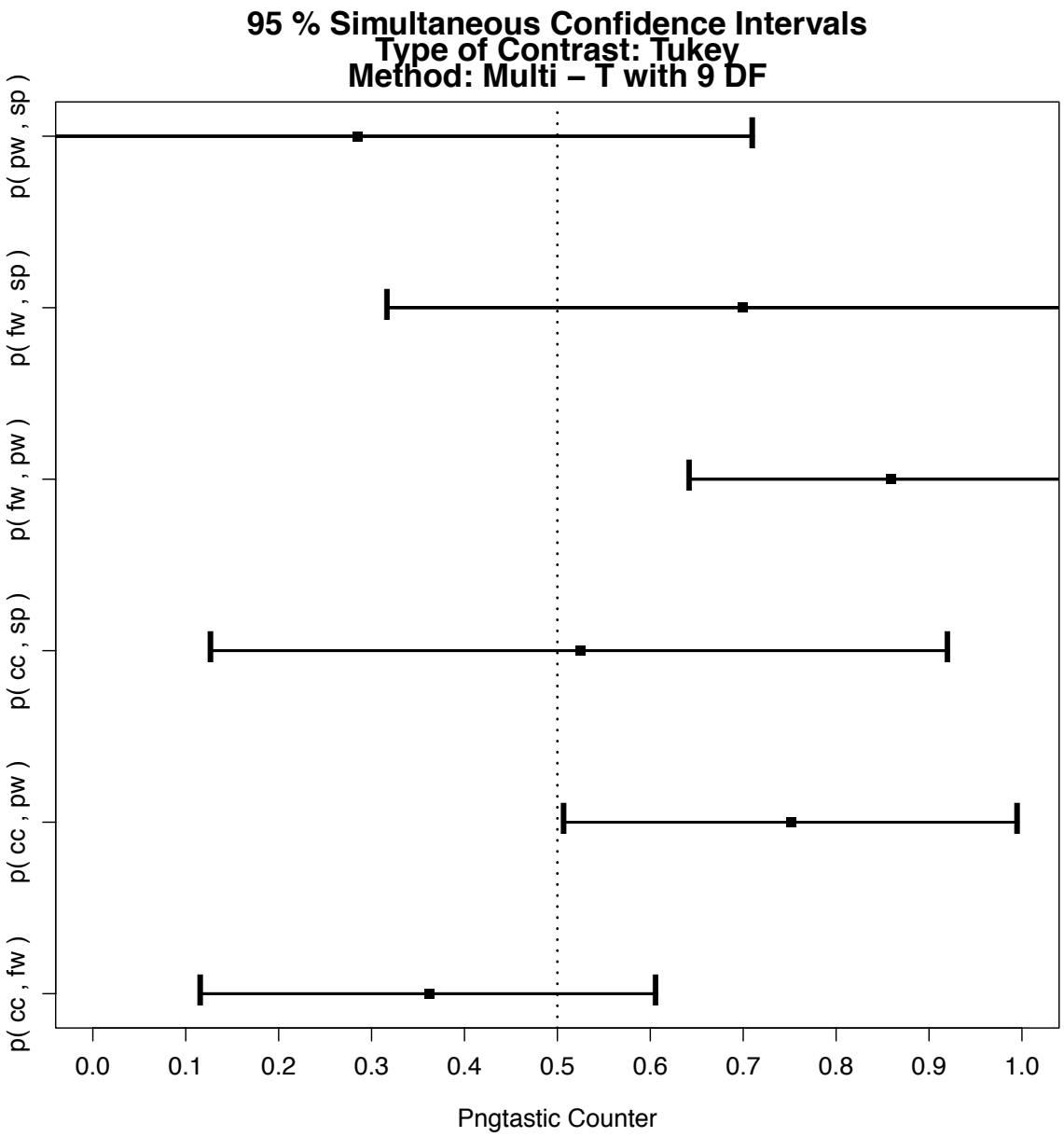


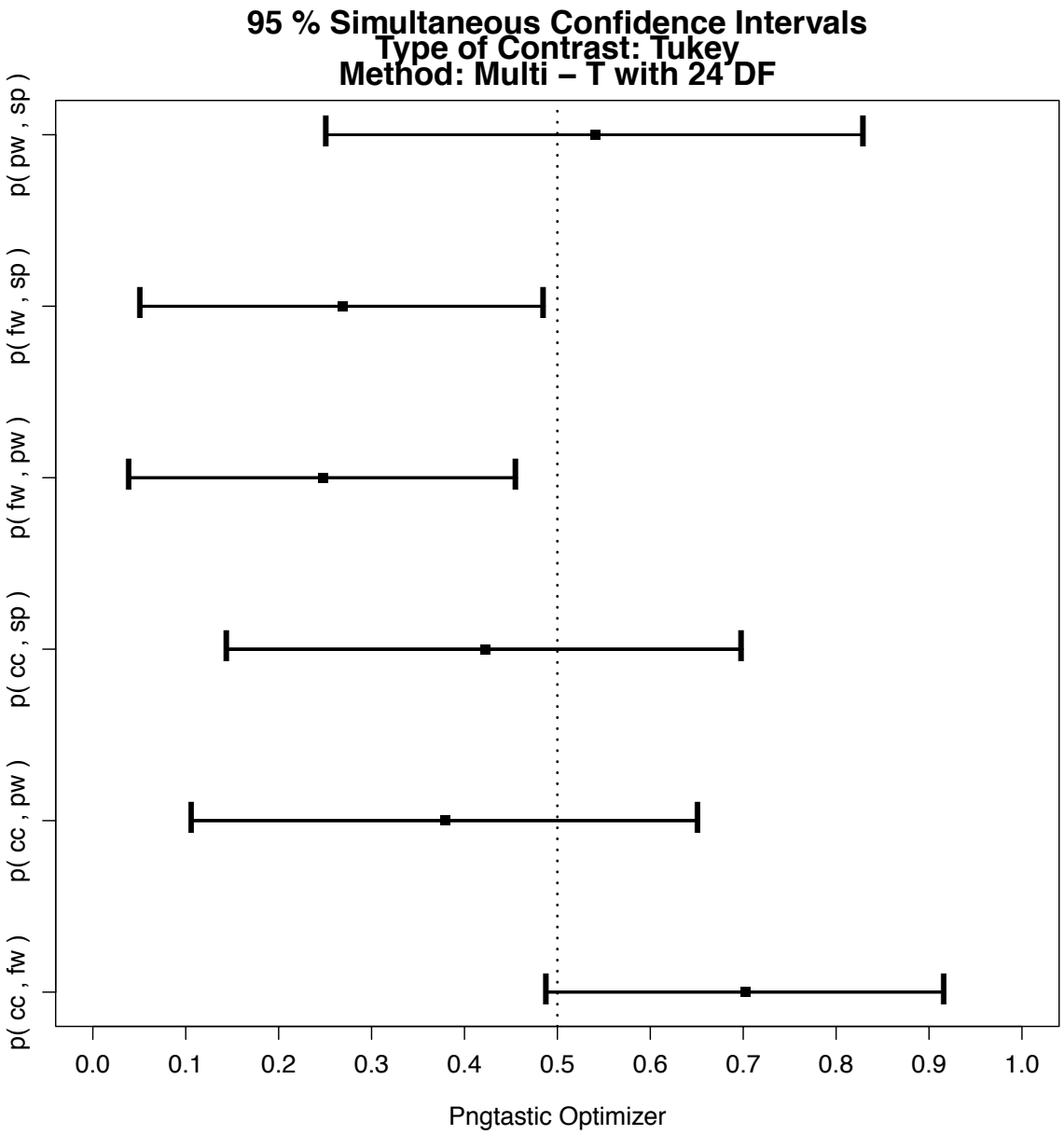


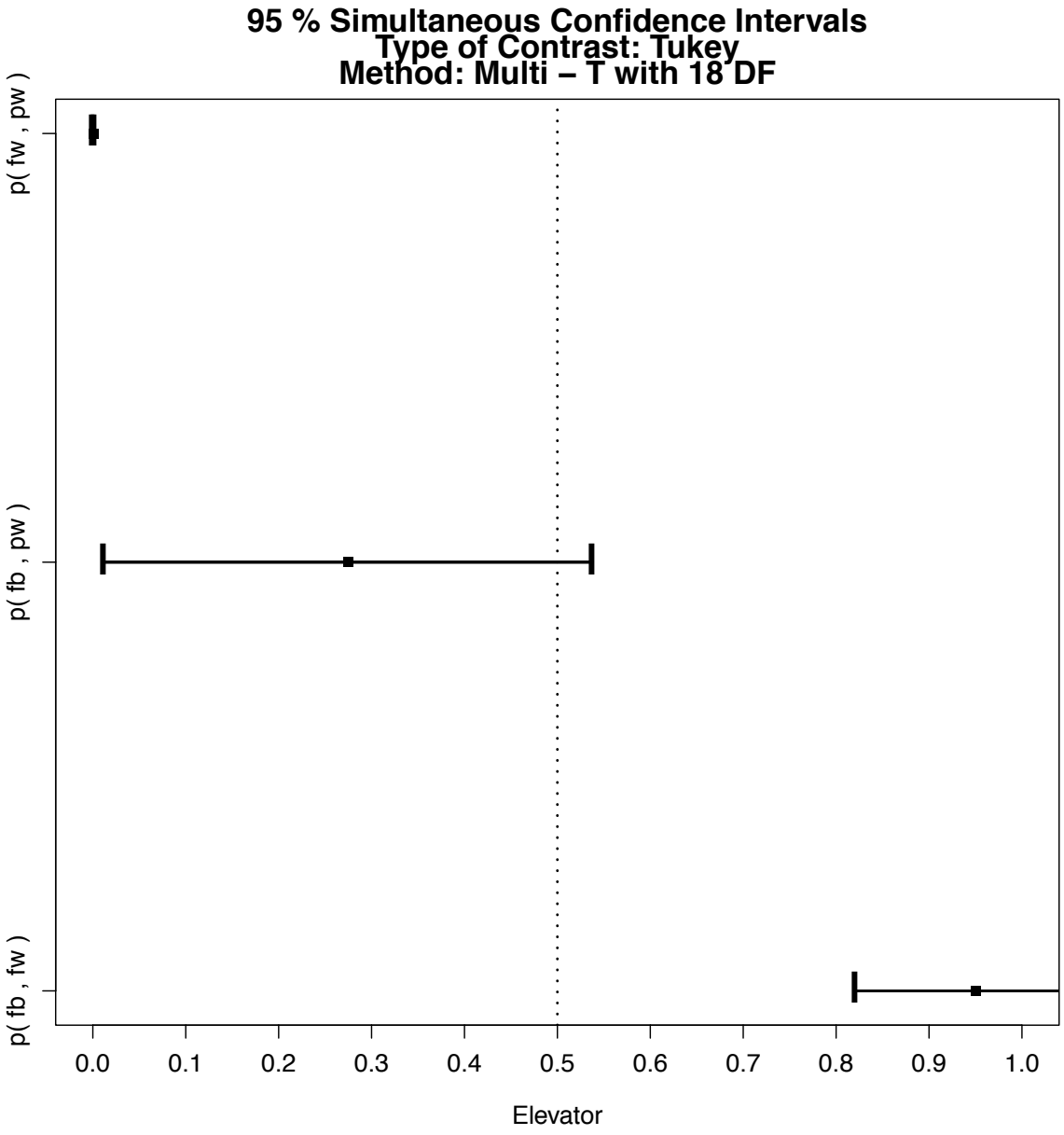


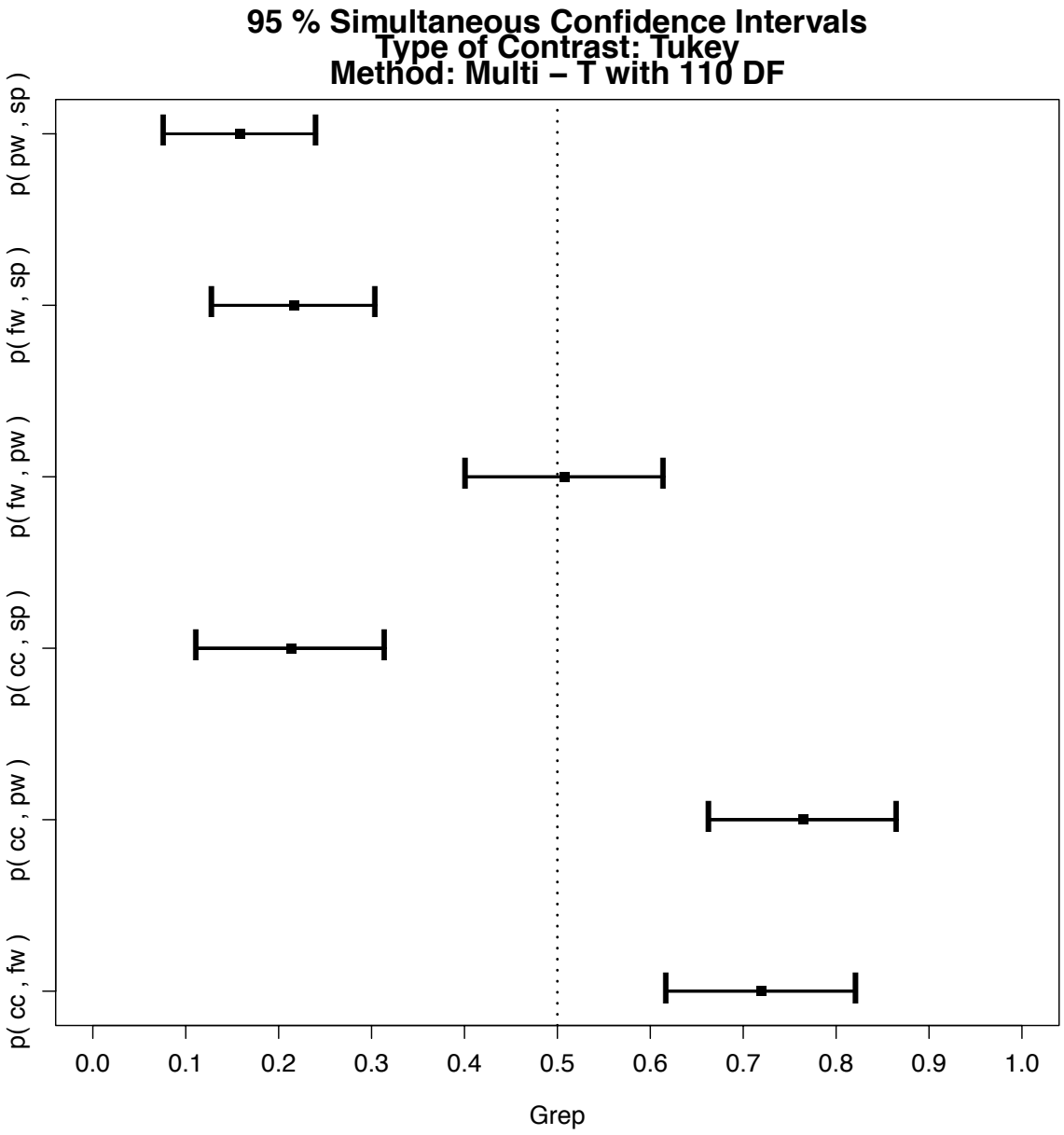
T-procedure error comparison *(Interpretation p(a,b) > 1/2 : b tends to be larger than a)*

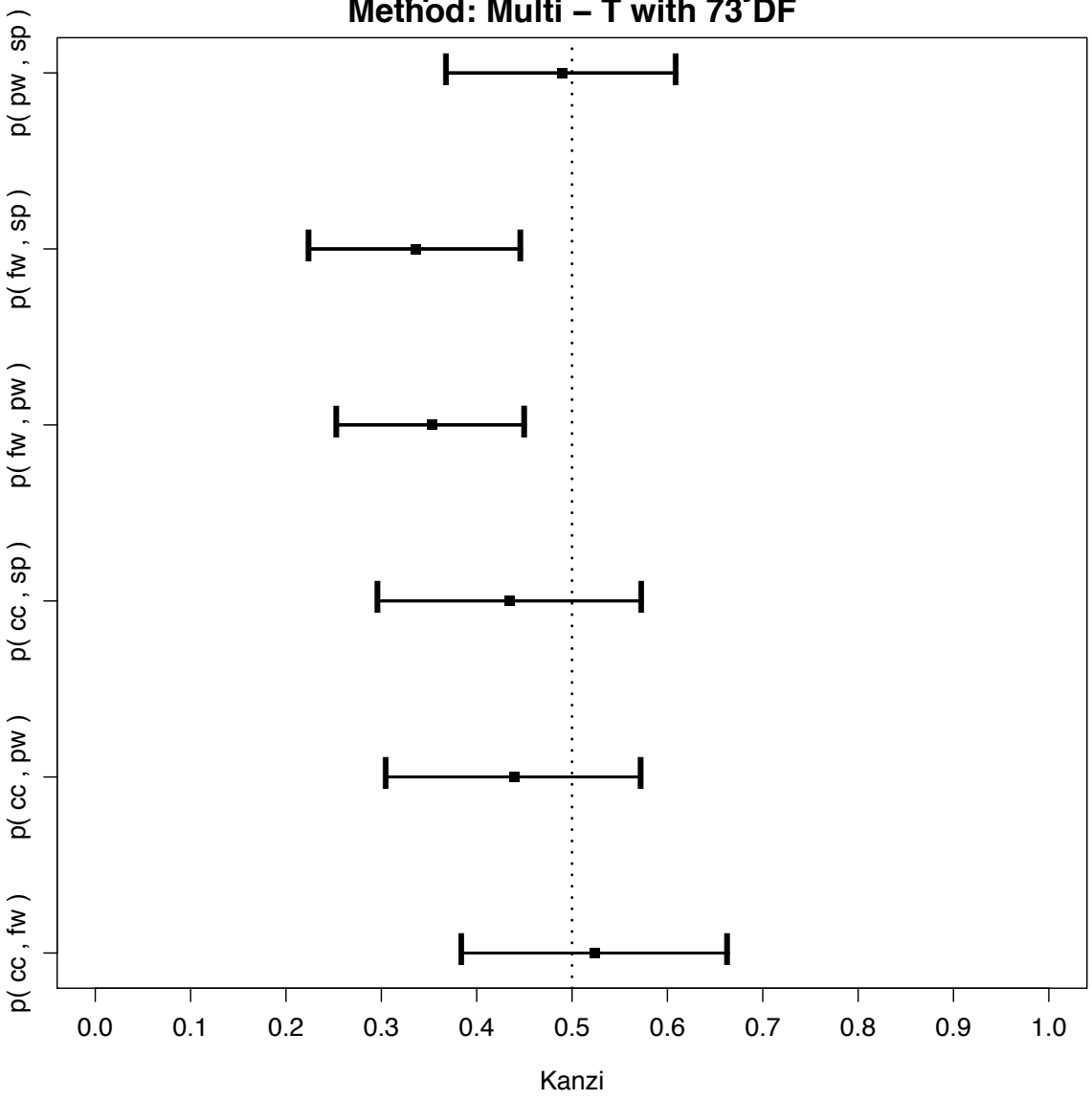


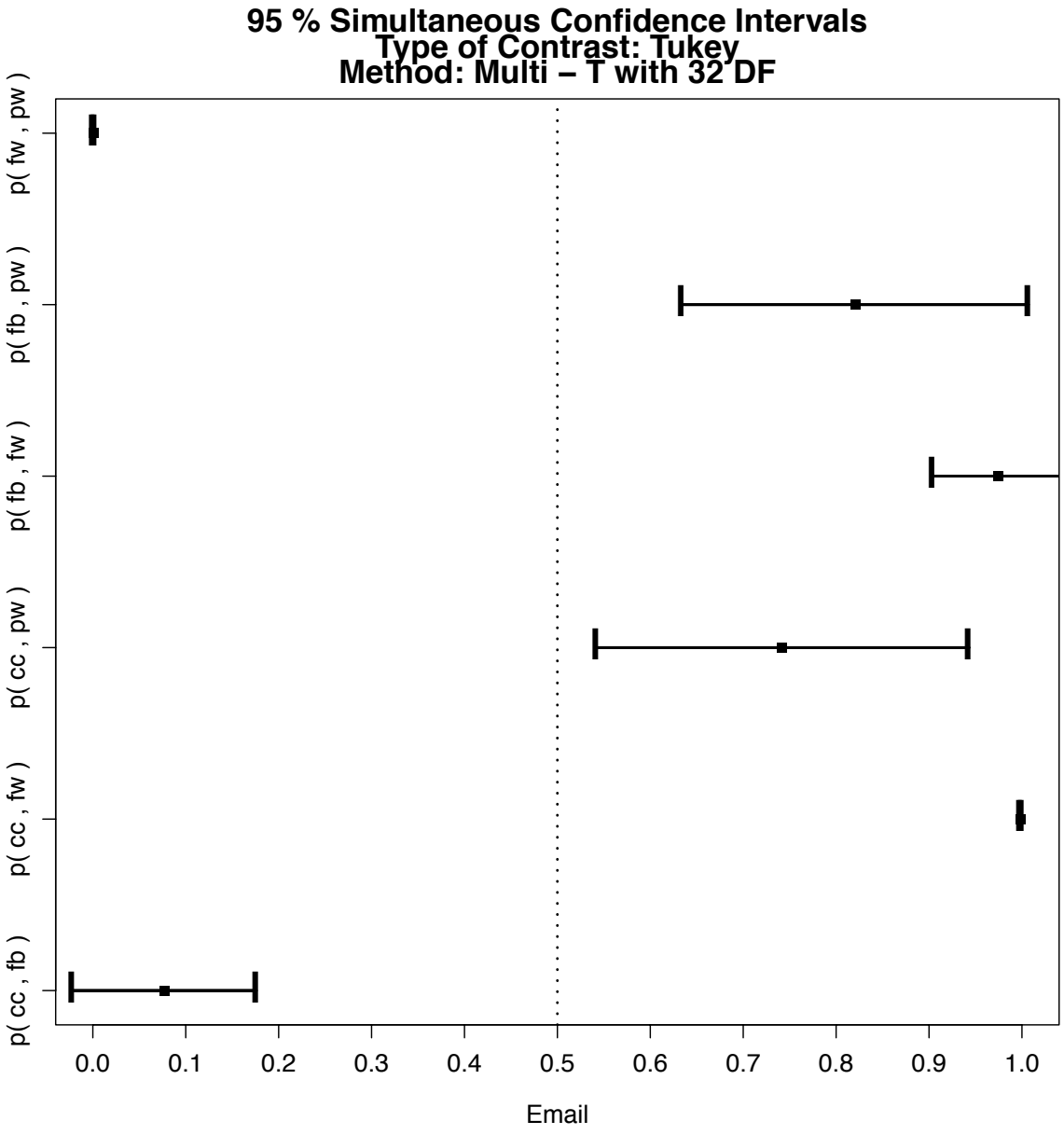

95 % Simultaneous Confidence Intervals
Type of Contrast: Tukey
Method: Multi – T with 9 DF
p(pw , sp)
p(fw , sp)
p(fw , pw)
p(cc , sp)
p(cc , pw)
p(cc , fw)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Pngtastic Counter

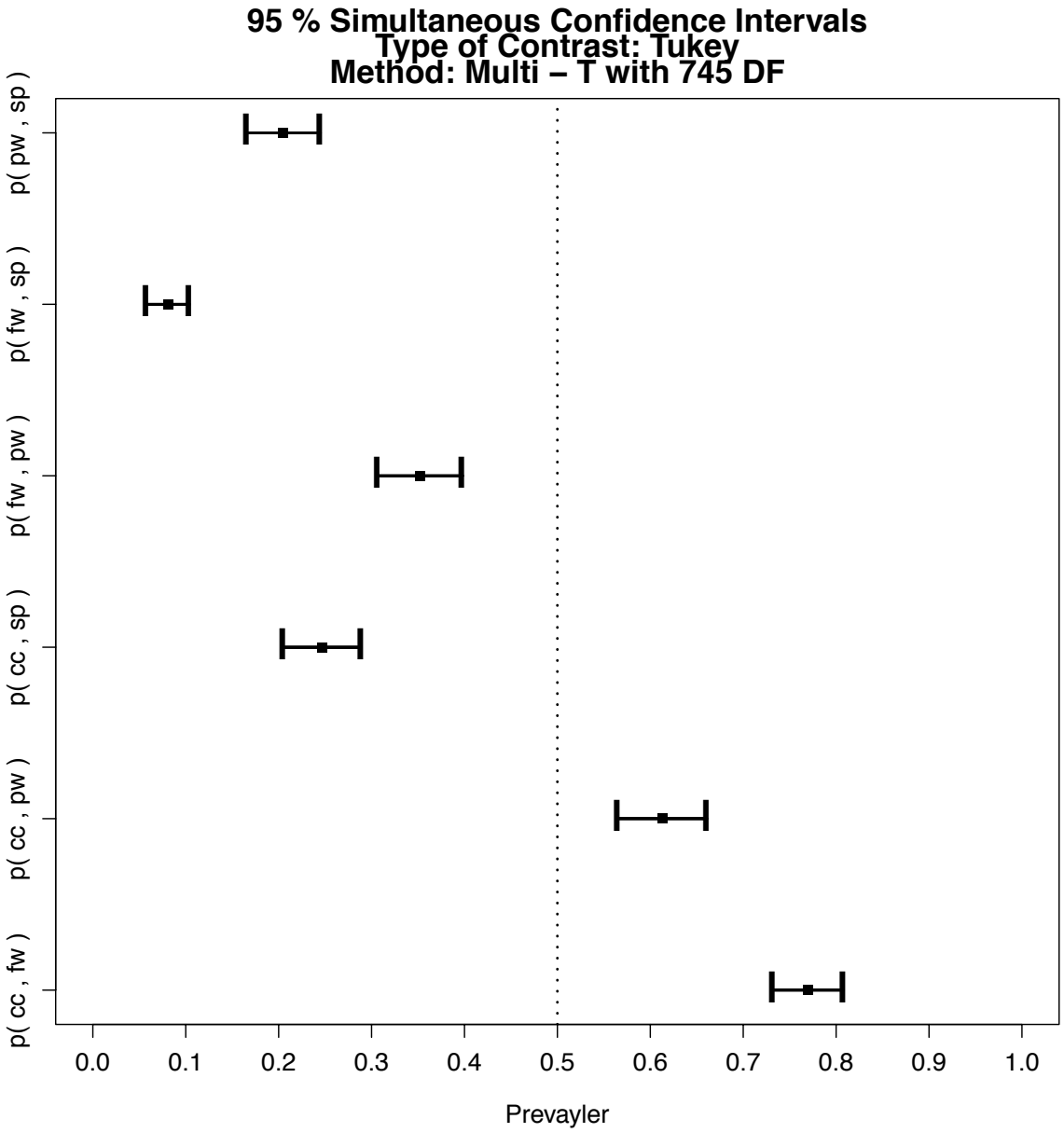

95 % Simultaneous Confidence Intervals
Type of Contrast: Tukey
Method: Multi – T with 24 DF
p(pw , sp)
p(fw , sp)
p(fw , pw)
p(cc , sp)
p(cc , pw)
p(cc , fw)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Pngtastic Optimizer

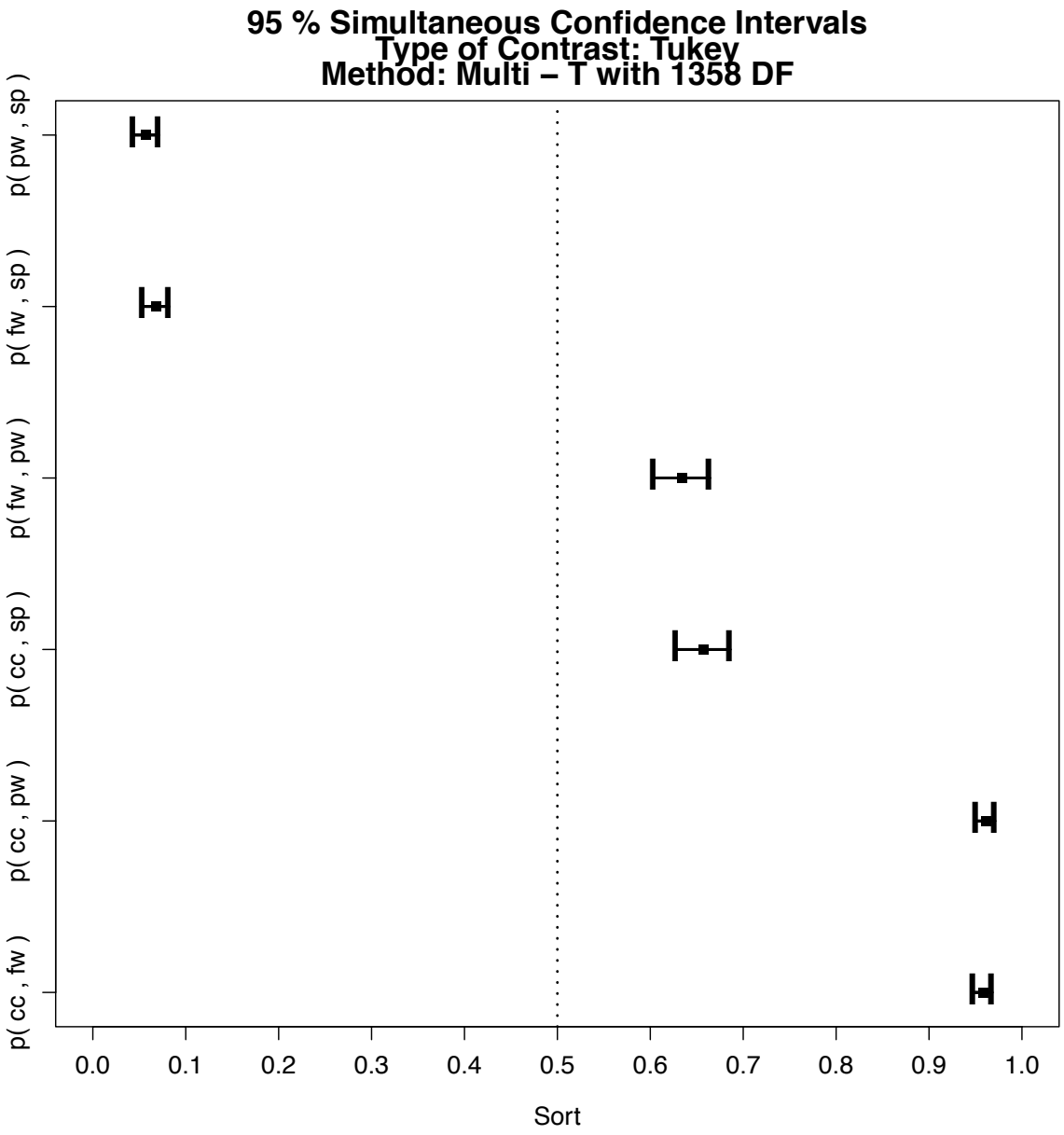

95 % Simultaneous Confidence Intervals
Type of Contrast: Tukey
Method: Multi – T with 18 DF
p(fw , pw)
p(fb , pw)
p(fb , fw)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Elevator

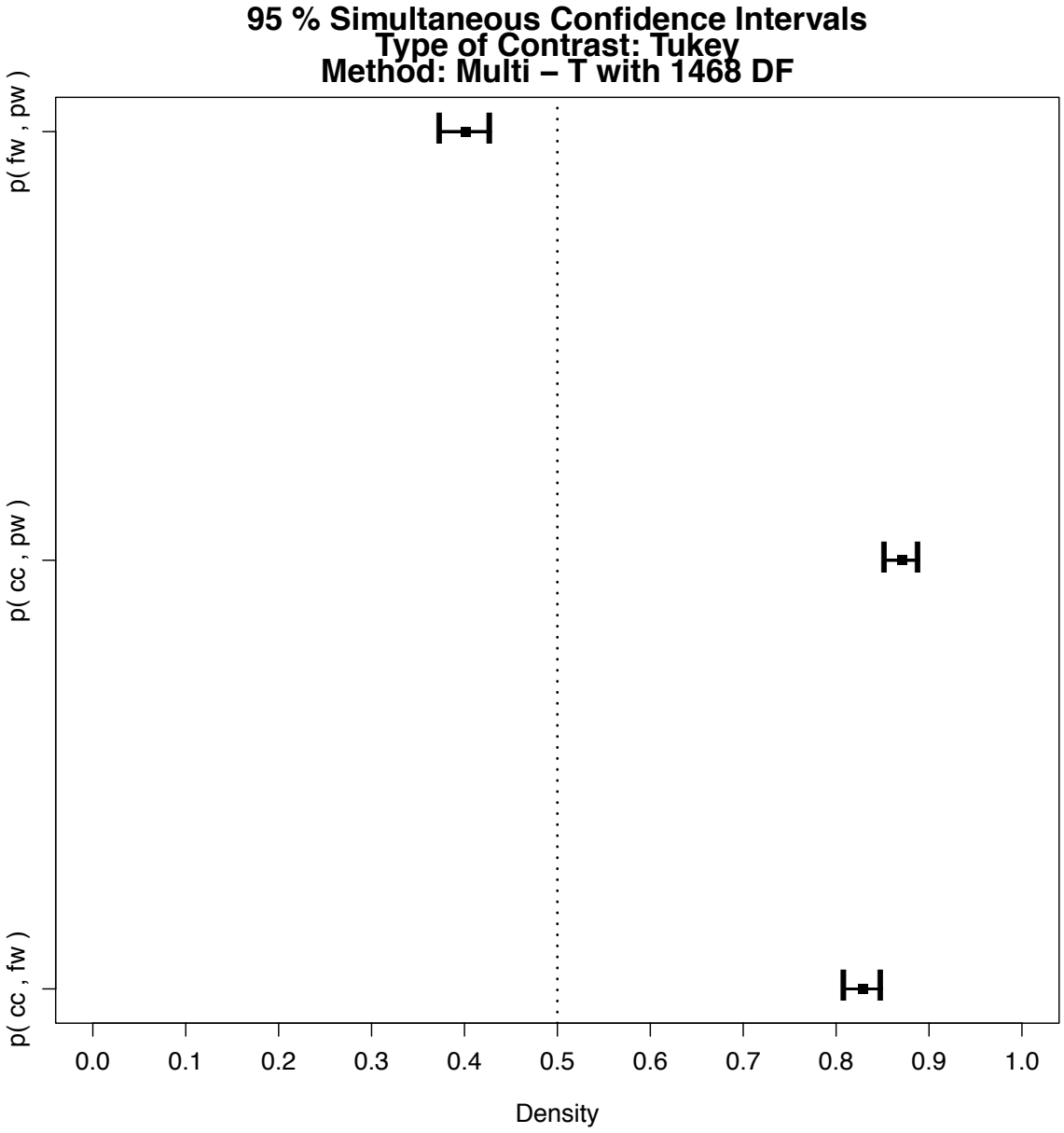

95 % Simultaneous Confidence Intervals
Type of Contrast: Tukey
Method: Multi – T with 110 DF
p(pw , sp)
p(fw , sp)
p(fw , pw)
p(cc , sp)
p(cc , pw)
p(cc , fw)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Grep


95 % Simultaneous Confidence Intervals
Type of Contrast: Tukey
Method: Multi – T with 73 DF
p(pw , sp)
p(fw , sp)
p(fw , pw)
p(cc , sp)
p(cc , pw)
p(cc , fw)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Kanzi


95 % Simultaneous Confidence Intervals
Type of Contrast: Tukey
Method: Multi – T with 32 DF
p(fw , pw)
p(fb , pw)
p(fb , fw)
p(cc , pw)
p(cc , fw)
p(cc , fb)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Email


95 % Simultaneous Confidence Intervals
Type of Contrast: Tukey
Method: Multi – T with 745 DF
p(pw , sp)
p(fw , sp)
p(fw , pw)
p(cc , sp)
p(cc , pw)
p(cc , fw)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Prevayler


95 % Simultaneous Confidence Intervals
Type of Contrast: Tukey
Method: Multi – T with 1358 DF
p(pw , sp)
p(fw , sp)
p(fw , pw)
p(cc , sp)
p(cc , pw)
p(cc , fw)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Sort


95 % Simultaneous Confidence Intervals
Type of Contrast: Tukey
Method: Multi – T with 1468 DF
p(fw , pw)
p(cc , pw)
p(cc , fw)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Density

Prediction error of entire configuration space

S	BF/SA	FW	PW	SAD	FB	CC
1	0.18	56.51	5.89	0.18	N/A	0.07
2	1.54	0.79	1.52	1.59	N/A	1.07
3	0.88	16.74	0.81	0.88	N/A	0.99
4	1.23	46.98	1.44	1.23	2.81	1.23
5	1.95	30.45	89.77	1.99	N/A	3.53
6	1.23	1.82	1.21	1.22	N/A	3.14
7	0.35	100	32.97	1.68	N/A	19.36
8	2.84	109.30	26.87	2.70	N/A	9.08
11	2.31	89.23	614.95	2.47	N/A	1.52
12	0.72	625.37	179.78	N/A	N/A	6.52

Propagation algorithms

Algorithm 2: Propagate influence down

Input: $stmt, CFG, S \to \mathcal{P}(O)$
Output: $S \to \mathcal{P}(O)'$

```
1 Function propagate_down
2     ipdom := ipdom(stmt, CFG) ▷ Get immediate post-dominator
      ▷ Get set of statements in all paths
3     pstmts := paths_stmts(stmt, ipdom) − ipdom
4     for each ps ∈ pstmts do
          ▷ influence(ps): S → P(O)
5         if influence(ps) ⊃ influence(stmt) then
6             influence(ps) := influence(stmt)
7         end
8     end
9 end
```

Algorithm 3: Propagate regions up

Input: $stmt, CFG, S \to \mathcal{P}(O), GI : \mathcal{P}(O)$
Output: $S \to \mathcal{P}(O)'$

```
1 Function propagate_up
2     for each pred ∈ preds(stmt, CFG) do
          ▷ influence(s): S → P(O)
3         if influence(pred) ∪ influence(stmt) ∈ GI ∧ influence(pred) ≠ influence(pred) ∪ influence(stmt)
           then
4             influence(pred) := influence(stmt)
5         end
6     end
7 end
```