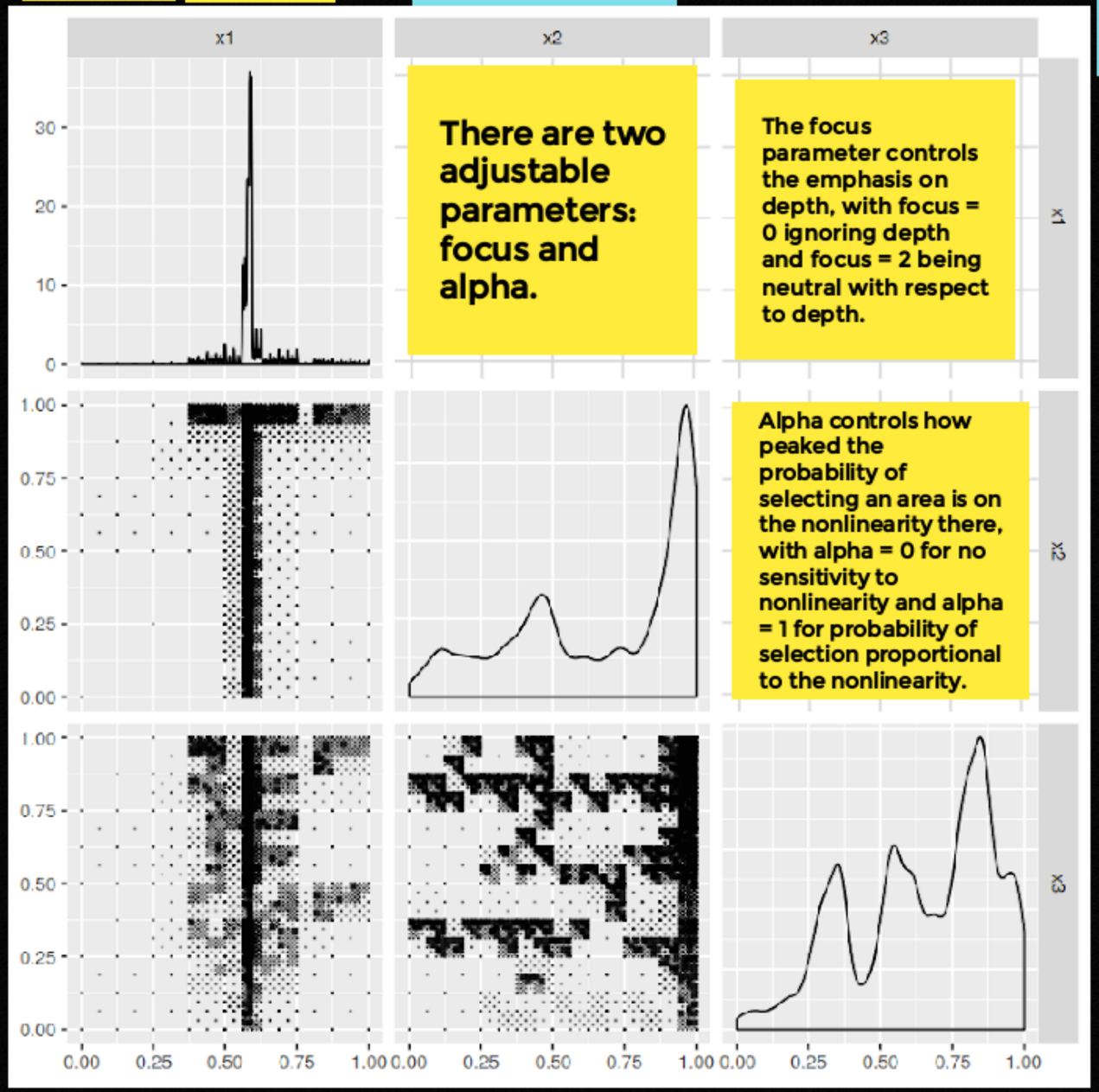
Depth depends on nonlinearity.

Sampling is probabilistic.

Hierarchical full-factorial sampling.



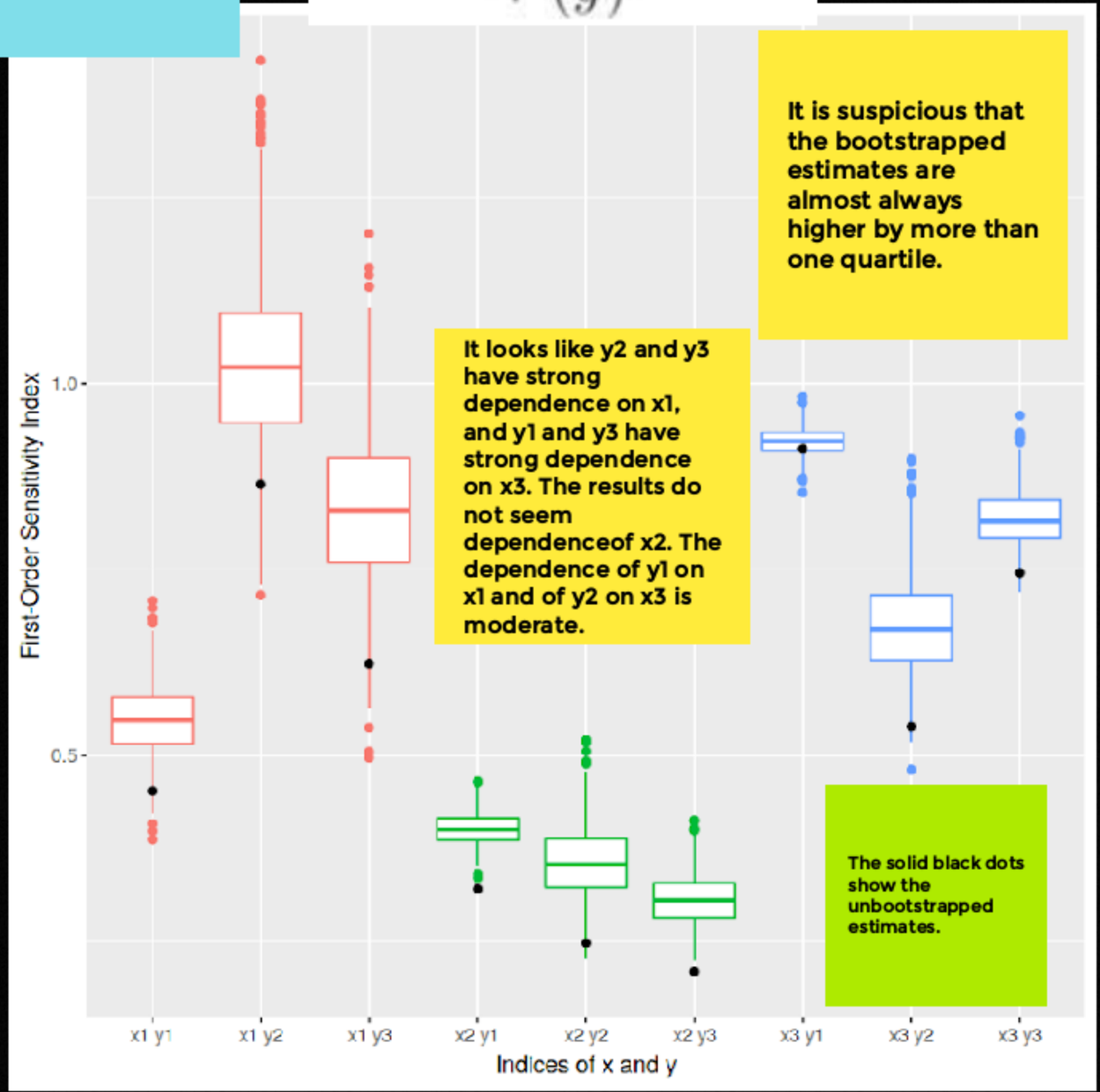
There are two adjustable parameters: focus and alpha.

The focus parameter controls the emphasis on depth, with focus = 0 ignoring depth and focus = 2 being neutral with respect to depth.

Alpha controls how peaked the probability of selecting an area is on the nonlinearity there, with alpha = 0 for no sensitivity to nonlinearity and alpha = 1 for probability of selection proportional to the nonlinearity.

First-Order Sensitivity Indices

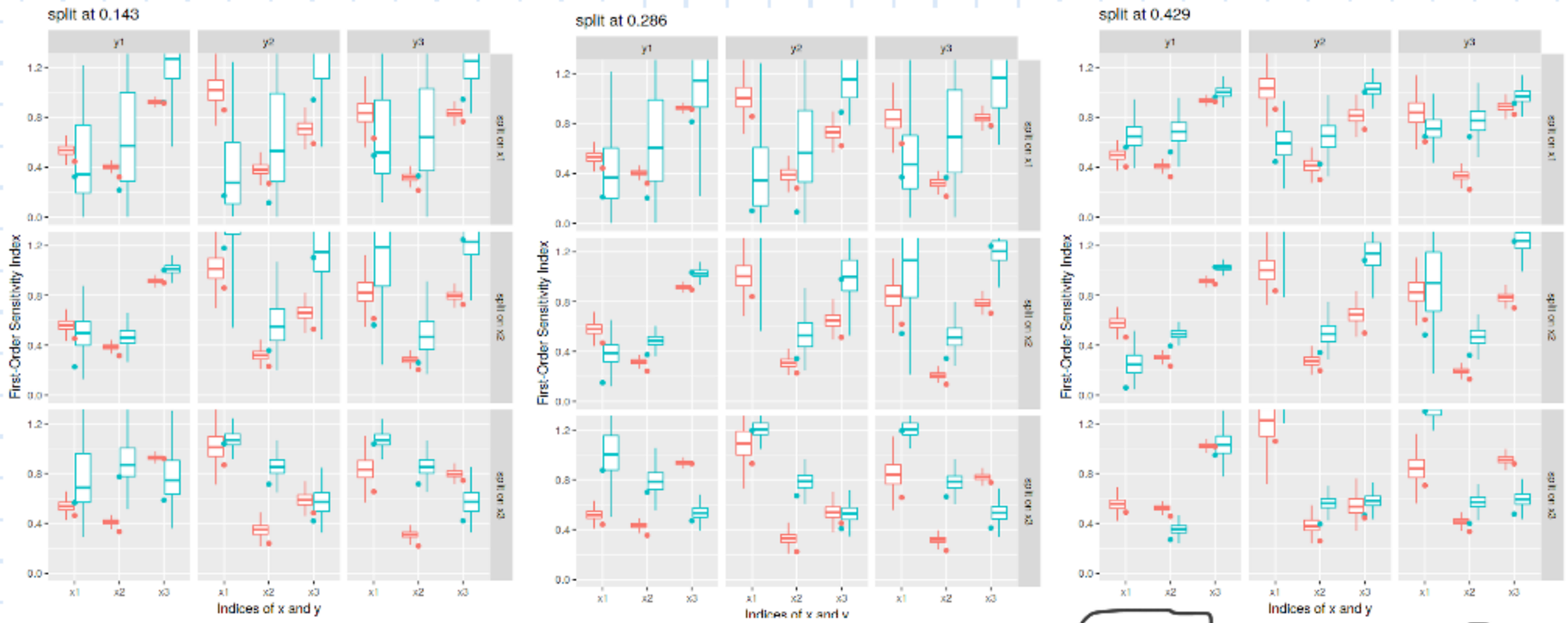
$$\frac{\mathrm{V}_{x_i}\left(\mathrm{E}_{\mathbf{x}_{\sim i}}\left(y \mid x_i\right)\right)}{\mathrm{V}\left(y\right)}$$



It is suspicious that the bootstrapped estimates are almost always higher by more than one quartile.

It looks like y2 and y3 have strong dependence on x1, and y1 and y3 have strong dependence on x3. The results do not seem dependenceof x2. The dependence of y1 on x1 and of y2 on x3 is moderate.

The solid black dots show the unbootstrapped estimates.



The solid dots show the unbootstrapped estimates.

Partition the data by splits in x1, x2, or x3, and compare sensitivities below and above the split.

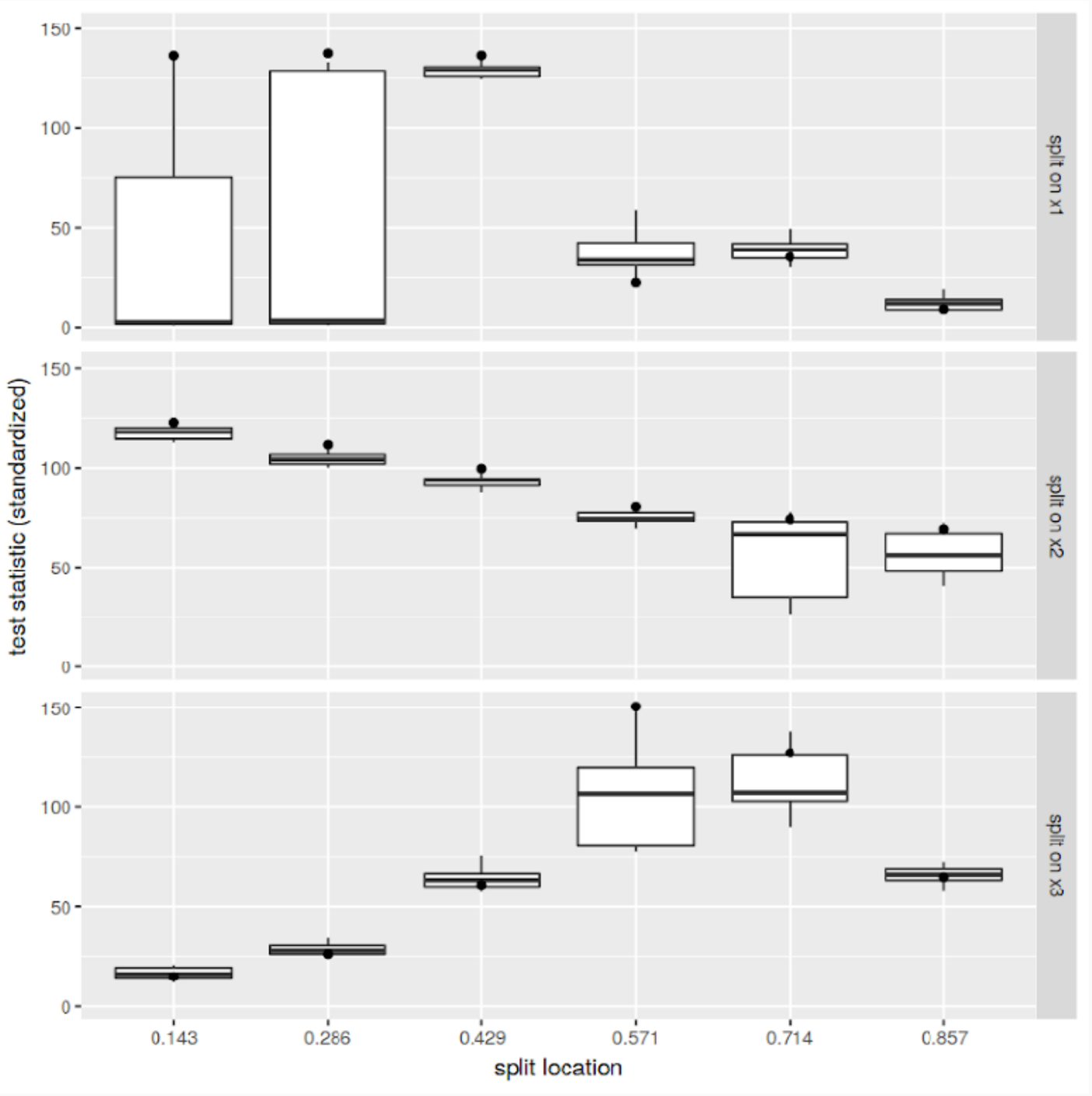
Splitting x1, x2, or x3 at 1/7 doesn't yield significant differences in the sensitivity indices on either side of the split.

By the time the split reaches beyond 2/7, significant differences appear. For example, that of y3 on x1 when split into the insignificant x3 > 6/7 vs the significant x3 < 6/7.

Instead of using sensitivity indices to determine the split, just compare the empirical density functions on either side of the split.

Because of the computational expense of the two-sample test, we only resample 15 times for the bootstrap confidence intervals.

The solid dots show the unbootstrapped estimates.



This method clearly identifies the phase boundary near x1 = 0.5.

There is also evidence for a phase boundary near x3 = 0.6.