

Notes: Undervote Example From Simon Jackman

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UNDERVOTE.ODC

1. Model → Specification →
2. double-click "model" in Document Window
3. → Check Model
4. double-click "list" under "data" in Document Window
5. → Load Data
6. → Compile
7. (if loading inits) double-click "list" under "inits" in Document Window
8. (if loading inits) → Load Inits
- 8A. → Gen Inits
9. Inference → Samples → type "delta" → set
10. Inference → Samples → type "good" → set
11. Model → Update → type number in box → update
12. [Bring "Sample Monitoring Tool" to front] → select "delta" → stats
17. select "good" → stats

Undervoting for President, by Race: difference in two binomial proportions.

In exit polls for the 1992 election, the Voter News Service asked black and white voters if they did not vote for president (a phenomenon known as "intentional undervoting"). Of 6,537 black voters, 26 said they did not vote for president; of 44,531 white voters, 91 said they did not vote for president.

In the American National Election Studies (1964-2000), of 1,101 black voters, 10 report not voting for president, while 57 of 9,827 white voters report not voting for president. Substantive interest centers on whether this rate of intentional undervoting differs by race.

These data appear in Tomz and Van Houweling (2003), "How Does Voting Equipment Affect the Racial Gap in Voided Ballots?", *American Journal of Political Science*.

```

model{
  for (i in 1:4){
    r[i] ~ dbin(p[i],n[i])
  }

  delta[1] <- p[2] - p[1]  ## difference
  good[1] <- step(delta[1]) ## sign of the difference

  delta[2] <- p[4] - p[3]  ## difference
  good[2] <- step(delta[2]) ## sign of the difference

  ## priors
  for(i in 1:4){
    p[i] ~ dunif(0,1)
  }
}

```

Data:

```
list(r=c(26,91,10,57),n=c(6537,44531,1101,9827))
```

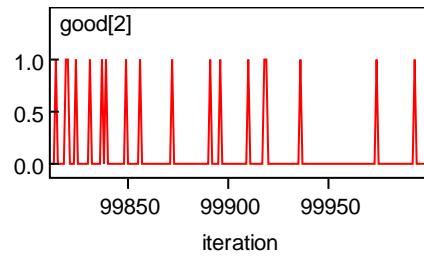
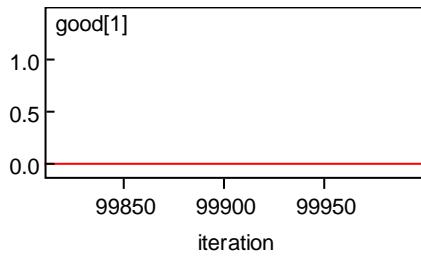
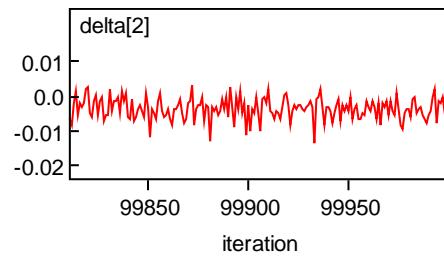
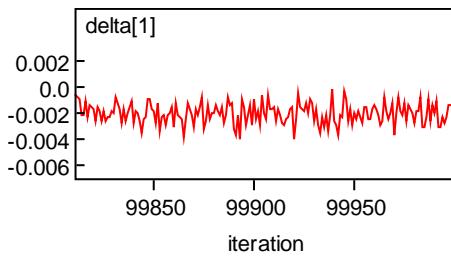
Since the data set is tiny and the computation trivial, we can generate a large number of samples from the posterior densities:

Results:

node	mean	sd	MC error	2.5%	median	97.5%	start	sample
delta[1]	-0.0020638	2.19E-4	8.192E-7	-0.003805	-0.002016	-5.876E-4	3000001	1000000
delta[2]	-0.0040730	0.00309	3.09E-6	-0.01088	-0.0038	0.001177	3000001	1000000
good[1]	0.001802	0.04241	4.217E-5	0.0	0.0	0.0	3000001	1000000
good[2]	0.07692	0.2665	2.722E-4	0.0	0.0	1.0	3000001	1000000

The Bayesian p-values in the vector `good` can be contrasted with those arising from a classical analysis (e.g., using the functions in the `ctest` library in R); the differences between the classical analysis and the Bayesian simulation-based analysis are more pronounced for proportions in the smaller NES data set.

	VNS	NES
Classical two-sample test, one-sided, without continuity correction:	.0011	.0929
Classical two-sample test, one-sided, with continuity correction:	.0018	.1315
Fisher's exact test, one-sided:	.0033	.1330



node	mean	sd	MC error	2.5%	median	97.5%	start	sample
delta[1]	-0.0026	8.221E-4	2.493E-6	-0.0038	-0.0020	-5.853E-41	100000	
delta[2]	-0.0041	0.003091	9.931E-6	-0.0108	-0.0038	0.001154 1	100000	
good[1]	0.00187	0.0432	1.259E-4	0.0	0.0	0.0	1	100000
good[2]	0.07705	0.2667	8.325E-4	0.0	0.0	1.0	1	100000