

Applied Bayesian Analysis for the Social Sciences

Day 2: A more gentle introduction...

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Are we all Bayesians?

- Bayesian modeling treats probability in the way we naturally think about probability.
- Not reliant on asymptotic properties to make inferences about quantities of interest.

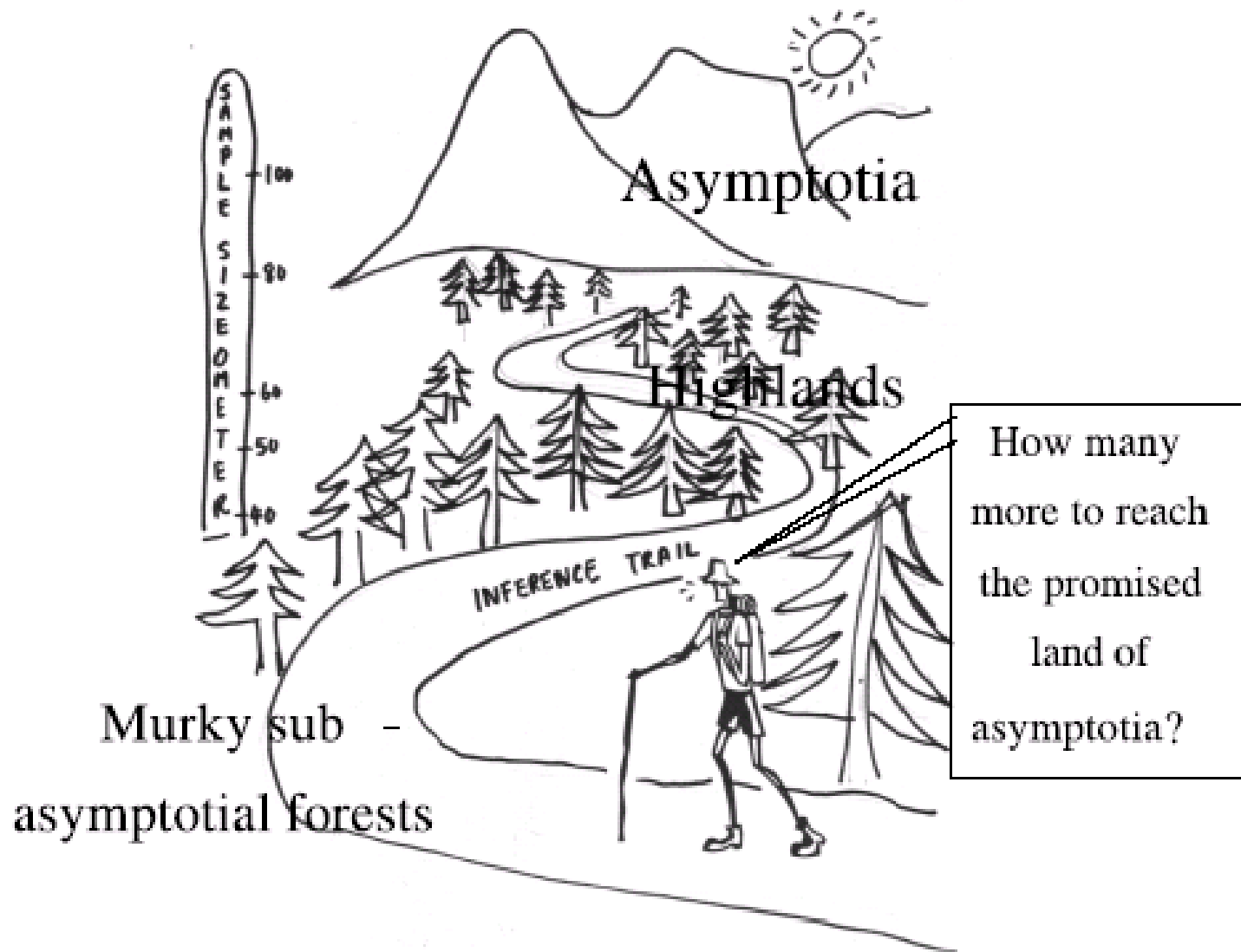


Figure 2. How large a sample is needed to reach the land of asymptotia?

- We don't replicate our data (usually)
- The data, once collected, are fixed.
- The parameter(s) are the random quantities.
 - we use priors to specify our uncertainty about these quantities.

- We summarize results with distributions rather than point estimates.
- This makes good sense in that we often think in terms of distributions.

Thinking with Distributions

- Think about moving to a new city and getting a new job.
- How do you plan your commute to work?
 - You may know how far you live from work
 - You may know the speed limit on the roads.
 - BUT...



- It may take longer to get to work than you planned.
- So...you update your information.
- Maybe you find a shortcut...



Expedia

Microsoft®
MapPoint®



or, an alternative mode of transport

Two of Upper Limit Aviation's Robinson R22 Beta II's on the back side of the Wasatch Mountains that rest over beautiful Salt Lake City....



Courtesy of R. Lorne Glick

Thinking with distributions...

- Or, maybe you leave at a different time

Regardless, you realize that on any given day, it may take longer or shorter to get to work.

How often have you said, “it depends on traffic” ?

updating

- As just discussed, we also update our beliefs as we collect new data.
- The highway is for suckers, so I take the helicopter.
- We've been updating since we were first aware of our surroundings.
- Ever touch a hot stove?
- Did you do it again?

The world's first Bayesian?



Time for some chalk...

- Now we'll combine a prior and a likelihood to derive a posterior.
- You MUST internalize the following:

$$P(\theta|X) \propto p(\theta)L(\theta|X)$$

The posterior is proportional to the prior times the likelihood

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