

# Online sellers revisited

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## Revisiting Online Sellers

- We now have five online sellers, each with different numbers of positive ratings from different numbers of total evaluations

Seller	Positive	Total	Percentage
One	10	10	100%
Two	48	50	96%
Three	186	200	93%
Four	75	100	75%
Five	1	2	50%

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- The more general research question now is to model the rates with which the sellers generate positive reviews

# Independent Rate Model

- The original rate model assumed that the  $k_i$  of positive ratings out of  $n_i$  total evaluations for the  $i$ th seller are generated by an underlying probability  $\theta_i$ , so that

$$k_i \sim \text{binomial}(\theta_i, n_i)$$

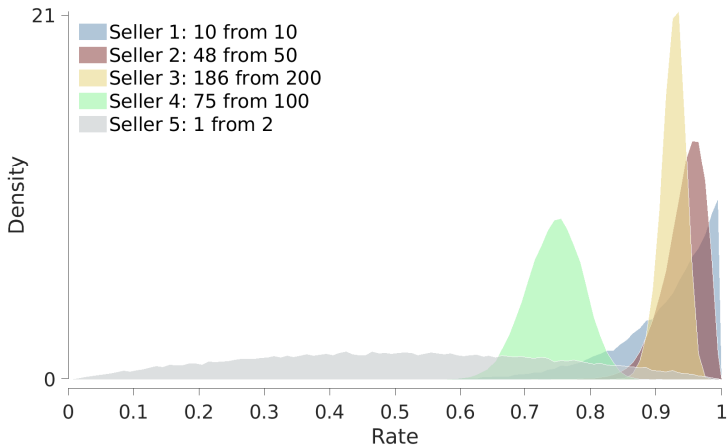
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- The underlying rates are **independent** of each other, and given the uniform prior  $\theta_i \sim \text{uniform}(0, 1)$

# Independent Rate Model Inferences



## Same Rate Model

- If we were willing to assume all the sellers had the same underlying rate, there would just be a single  $\theta \sim \text{uniform}(0, 1)$ , and the individual data would be generated as

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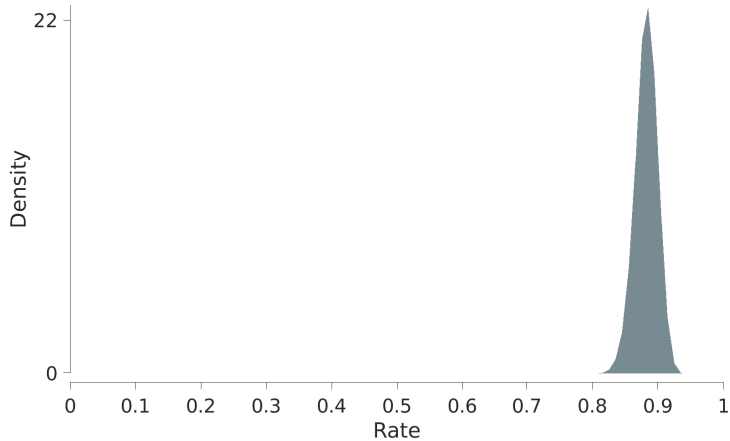
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  - historically, cognitive modeling has often **aggregated data** before inferring parameters, which implicitly corresponds to assuming there are no individual differences

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# Hierarchical Rate Model

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- In general, cognitive variables will have some mixture of sameness and difference, because both invariants and variation are involved in most cognitive phenomena

# Hierarchical Rate Model

- Hierarchical models allow both sameness and difference to be modeled, by assuming individual-level parameters that are connected by all being drawn from an over-arching group distribution

$$\theta_i \sim \text{Gaussian}(\mu, \sigma^2) \text{T}(0, 1)$$

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