Official office hours for the rest of the quarter: DD 17, 9-10am
Th 8:30-9:30am
Annalisa office hours will be posted on the course web page soon

\((y_1, y_2, \ldots) = 1\)

\(y_1, y_2, \ldots, y_n \quad | \quad y_{n+1}, y_{n+2}, \ldots\)

each

sample similar to unsample by each

\((y_1, y_2, \ldots) \rightarrow (y_{14}, y_{15}, \ldots)\)

each

like thinking of \((y_1, \ldots, y_n)\)
as like a random sample from \(\theta\)
possible real-world populations

1. if \( P = \{ \text{all AHE pts. at DH from Jan 2006 to Dec 2009} \} \) then
   
   sample = pop. & no inference is necessary; all you can do is description.

2. \( P = \{ \text{all AHE pts. in CA in that time window} \} \) is our dataset, not like a R.S. from this pop.,
   because we have no between-hospital variability.

3. \( P = \{ \text{all AHE pts. in DH from Jan 2001 to Dec 2015} \} \) and other
need to identify a broadest scope of valid generalizability not from your data set \{ \sigma \} \to \text{the population } \mathbb{P}.

always an OSE def. \( \mathbb{P} = \{ \sigma \} \) all pts. similar to those in the data set in relevant ways.

\[ P(\gamma, \ldots, \gamma_n | \Theta \Theta) = \prod_{i=1}^{n} p(\gamma_i | \Theta \Theta) \]

\[ p(\gamma | \Theta \Theta) \text{ sampling dist.} = \prod_{i=1}^{n} \Theta \Theta (1-\Theta) \]

\[ s_n = \sum \gamma_i \]

\( \gamma_i \sim \text{Bernoulli}(\Theta) \) simply
\[ p(y | B) = \int p(y | \theta, B) \, \theta \, d\theta \]

\[
\text{sampling list of } \theta \sim (1 - \theta) \text{ Bernoulli}.
\]

Useful trick in all stochastic modeling: hierarchical mixture model trick:

1. want to compute it directly
2. i ask myself - is there some other quantity \( \theta \) such that \( p(y | \theta, B) \) is easier?

\[ p(A | B) = p(A, B | \theta) + p(A, B_k | \theta) + \ldots \]

\[ \begin{array}{c}
\Omega \\
B_k
\end{array} \]
(1948): anything you want to know about any finite-dimensional prob. dist. can be learned to arbitrary accuracy by having a method for drawing random samples from it and of repeating (a) enough times & censoring...
either simulate a draw $y^*$ from $p(y | \theta)$ directly; or

1. simulate $\theta$ and draw from $p(\theta | y)$, obtaining $x^*$; 
2. simulate $y$ draw from $p(y | \theta^* Y)$

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$y | \theta$ 

\[ \begin{pmatrix} y | \theta \end{pmatrix} \leftrightarrow \begin{pmatrix} (\theta | y) \\ (y | \theta, B) \end{pmatrix} \]

\[ \begin{pmatrix} y, \theta \end{pmatrix} \]

prior (external) 

\[ \begin{pmatrix} (\theta | B) \sim p(\theta | B) \\ (y; 1: B) \sim \text{Bernoulli} \end{pmatrix} \]

2-stage or hierarchical process

Another approach would be to rewrite the equation in a different form. For instance, if we have the equation:

\[ \text{Problem: } \]

We can rewrite it as:

\[ \text{Rewrite: } \]

This approach provides a different perspective on the problem.