this time: foundations, preliminaries

read: (J ch. 1-2) Gelman et al. (G) ch. 1 [J Ap. A, B]

next time:

uncertainty is not a property of the world; it's a description of <u>your</u> information about the world

---

Soon we will be able to write things like $p(\theta \mid B)$ ← $B = \{B_1, \ldots, B_k\}$ all true by context & data-gathering process

(p = probability density function)

($\theta = \frac{\mu_T - \mu_C}{\mu_C}$)

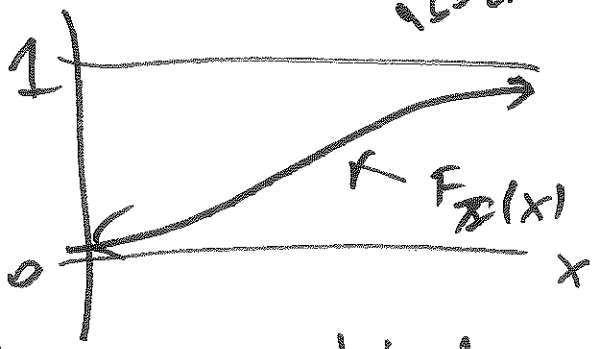
ex. B_1 = (the 572 people were like a random sample from P)

X random variable

$F_X(x) = P(X \leq x)$

cumulative distribution function (CDF)

$\theta = F$ (you may be uncertain about F)



uncertainty about functions

↕

Bayesian nonparametric methods

$P = (Q, C)$ ← natural language context

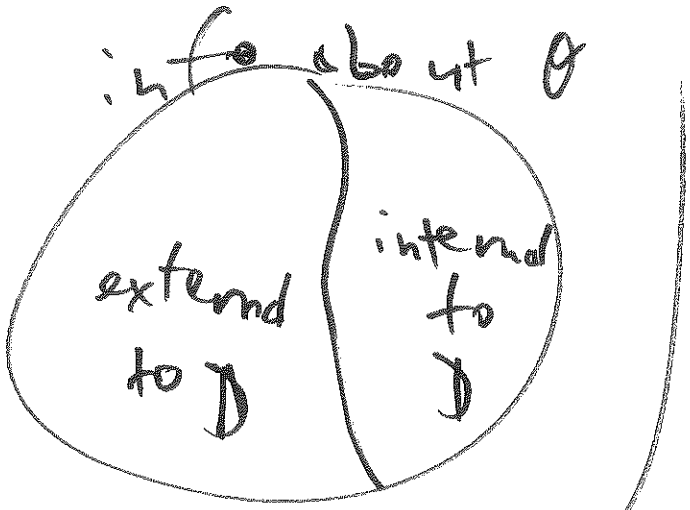
Q ↓ problem / question(s)

$(\theta, D, B = \{B_1, \ldots, B_k\})$

θ ↑ unknown(s)

D | data set

B ← background information



P = IHGA vs. standard

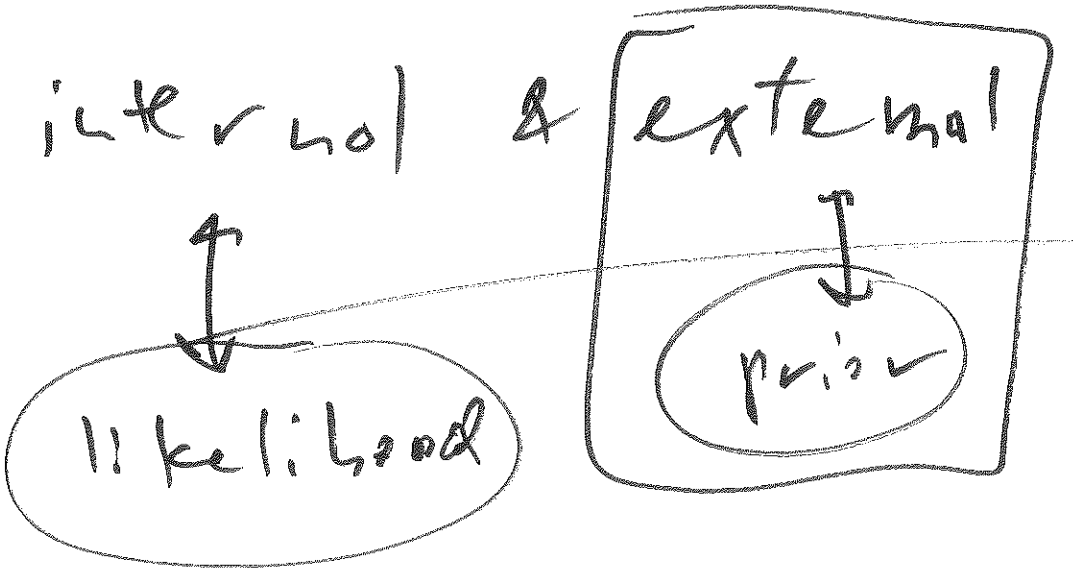
R: How much better is IHGA than no IHGA in reducing mean # of hospitalizations?

C: Read p. 2 of lecture notes part 1

$\theta = \frac{\mu_T - \mu_C}{\mu_C}$ ← document covers notes (lecture 8/30)

D = $\begin{bmatrix} 1 \\ 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix}_T$ $n_T = 285$ $\begin{bmatrix} 0 \\ 0 \\ 1 \\ \vdots \\ 0 \end{bmatrix}_C$ $n_C = 257$

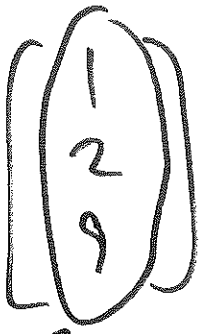
we will need a way to quantify how much info. we have, both internal & external to $\mathcal{D}$.



k sets

$p(\omega \in \{1, 9\})$

$\uparrow A$ T/F prop.

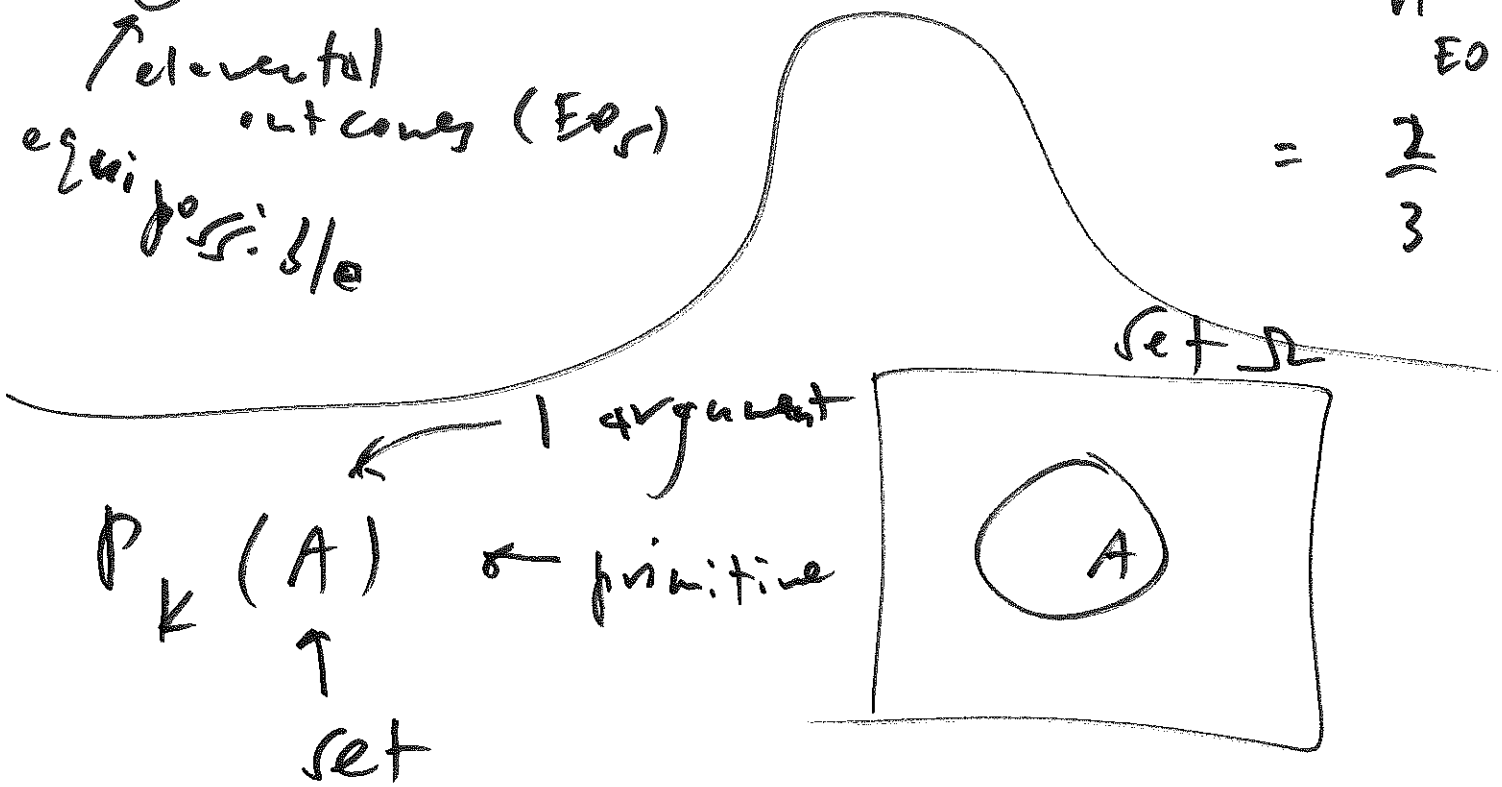


at random $[\Sigma_1]$

$p(\underbrace{\Sigma_1 \text{ is odd}}_{A}) = \frac{n_A}{n_{EO}} = \frac{2}{3}$

↑ elemental outcomes (EO_s)

equipossible



$P_{BF}(\underline{A} \mid \underline{B})$ ← primitive

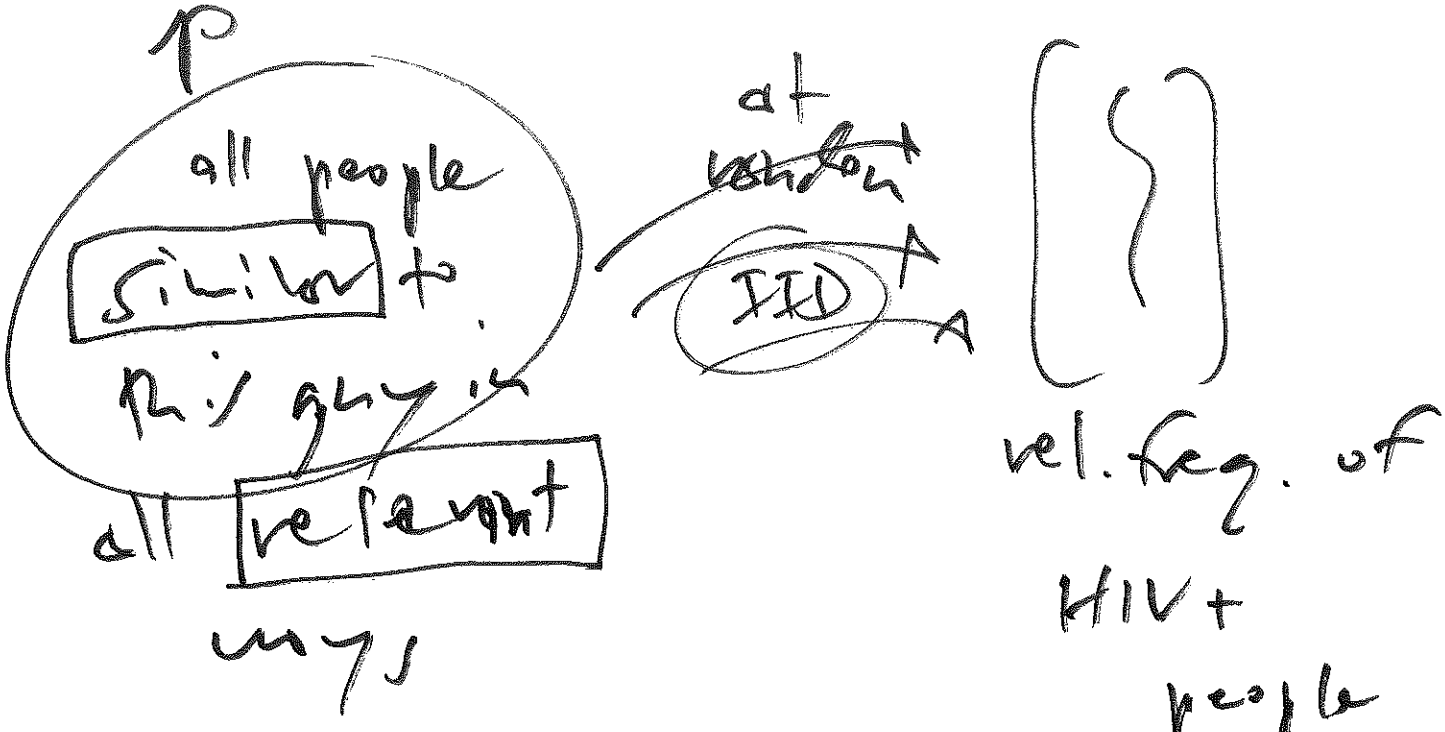
↖ ↖ T/F propositions

belief & betting odds

$P_{CJ}(A \mid B)$ ← primitive

↖ ↖ T/F propositions

P_F(this guy is HIV+) = ?



$P(A) = p$

odds in favour of A is $o = \frac{p}{1-p}$

$p = \frac{o}{1+o}$

we need in science, with our methods for separating signal from noise, a way of finding out how often our methods get the right answer