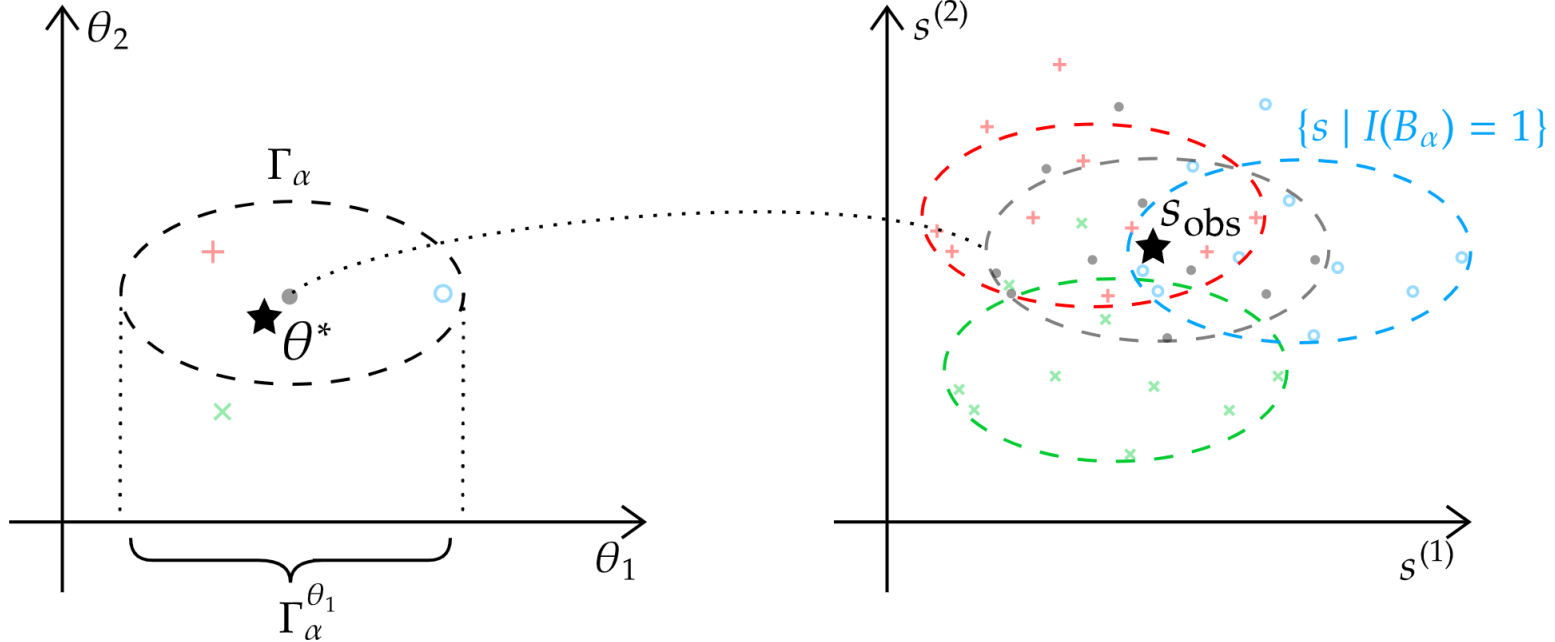


Simulation-based, Finite-sample Inference for Privatized Data

Data generating equation $s_{\text{obs}} = G(U, \theta^*)$, $U = (u_{\text{data}}, u_{\text{privacy}})$

Confidence set (of parameters θ)

Prediction sets (of statistics s)



Build B_α with conformal prediction. $S = (s_{\text{obs}}, s_1^\theta, \dots, s_R^\theta)$

$T_{(i)}^\theta$ is the i th order statistics of $\{T_{\text{obs}} = T(s_{\text{obs}}; S), T(s_1^\theta; S), \dots, T(s_R^\theta; S)\}$

Prediction / Confidence set $P_{s_{\text{obs}} \sim F_\theta} \left(T_{\text{obs}} \in \left[T_{(\alpha(R+1)+1)}^\theta, T_{(R+1)}^\theta \right] \right) \geq 1 - \alpha$

p -value for $H_0 : \theta^* \in \Theta_0$ $p = \frac{1}{R+1} \left[\sup_{\theta \in \Theta_0} \left[\#\{i \mid T_{(i)}^\theta \leq T_{\text{obs}}\} + T_{\text{obs}} \right] \right]$