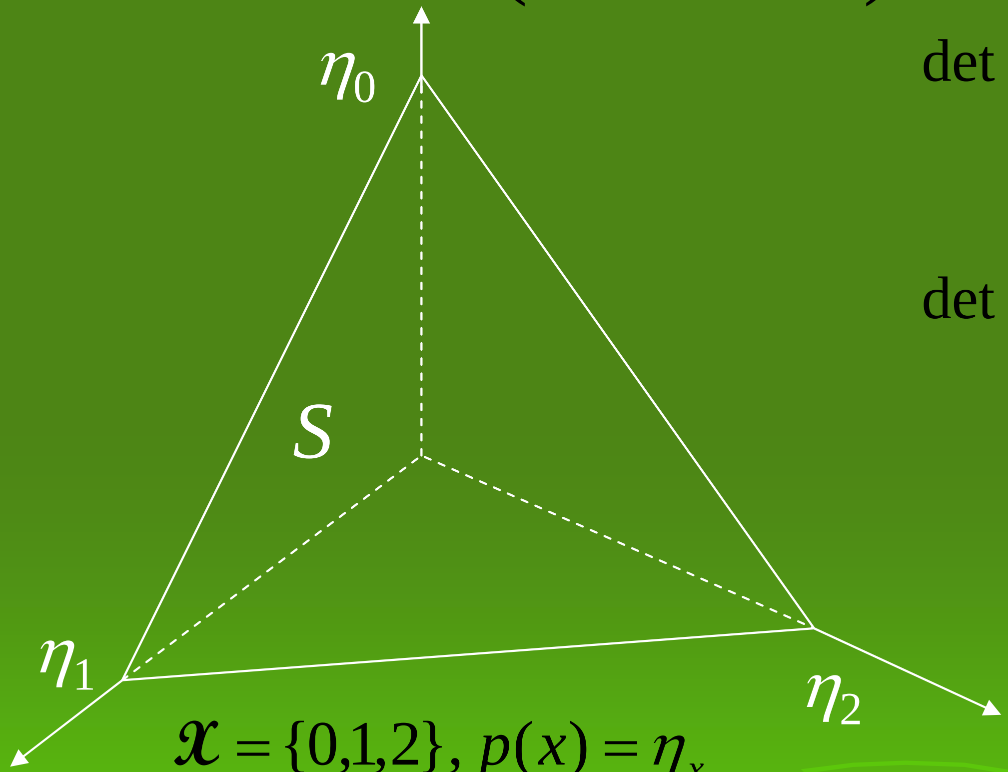
# P61 定常Markovモデルの体積要素と拡大モデルについて　竹内純一

## 多項ベルヌーイモデルの場合

$\bar{S}$:拡大モデル(非正規化)




$$\mathcal{X} = \{0,1,2\},\ p(x) = \eta_x$$

$$\eta = (\eta_1, \eta_2) \text{ for } S$$

$$\eta = (\eta_0, \eta_1, \eta_2) \text{ for } \bar{S}$$

$$\det J = \begin{vmatrix} 1/\eta_1 + 1/\eta_0 & 1/\eta_0 \\ 1/\eta_0 & 1/\eta_2 + 1/\eta_0 \end{vmatrix} = \frac{1}{\eta_0\eta_1\eta_2}$$

$$\det \bar{J} = \begin{vmatrix} 1/\eta_0 & 0 & 0 \\ 0 & 1/\eta_1 & 0 \\ 0 & 0 & 1/\eta_2 \end{vmatrix} = \frac{1}{\eta_0\eta_1\eta_2}$$

$J$ : Fisher情報行列

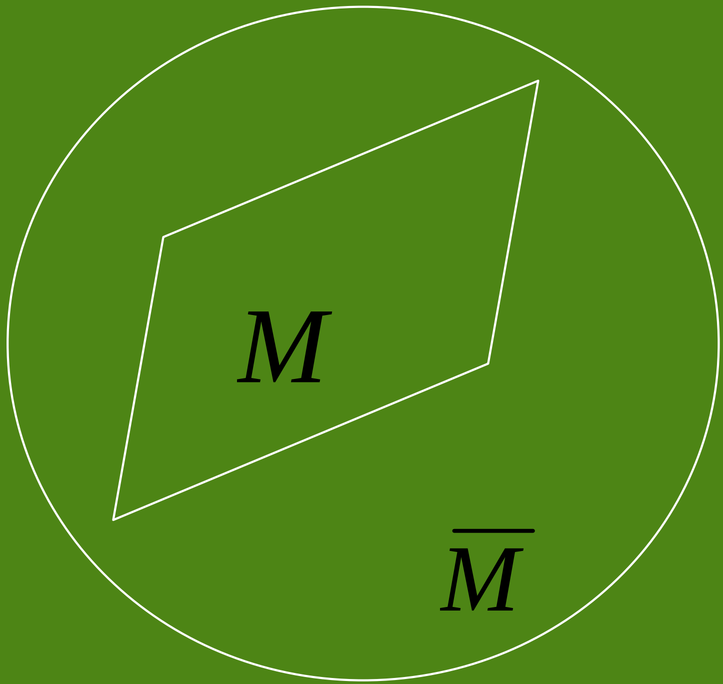
$S$の体積要素(密度)　$\sqrt{(\det J)}$

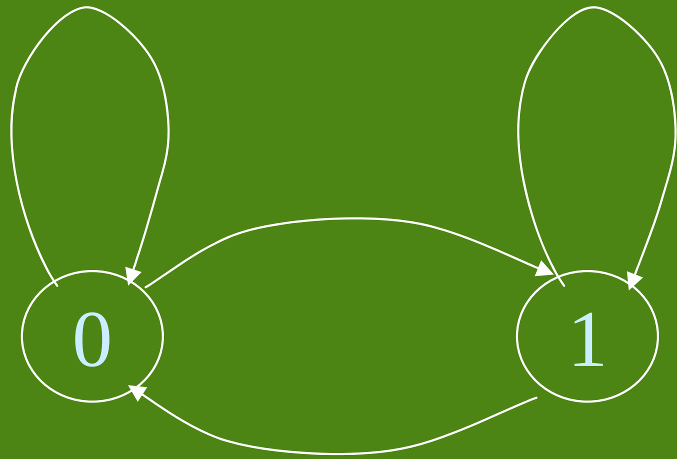
$S$のJeffreys事前分布　$w(\eta) \propto \sqrt{(\det J)}$

なぜ $\det J = \det \bar{J}$ か？

# マルコフ連鎖モデルの場合

２状態の例




$$\mathcal{X} = \{0,1\}$$

$$\eta = (\eta_{00}, \eta_{10})$$

$$\bar{\eta} = (\eta_{00}, \eta_{01}, \eta_{10}, \eta_{11})$$

$$\det J = \left( \sum_{x \in \mathcal{X}} \Delta_{xx} \right)^2 \prod_{x \in \mathcal{X}} \frac{\eta_x}{\prod_{y \in \mathcal{X}} \eta_{xy}}$$

$$\det \bar{J} = 0$$

[Takeuchi 2009]

拡大モデルでは

$\bar{J}$ が退化する