# Measure-preserving And Discrete (MAD) map

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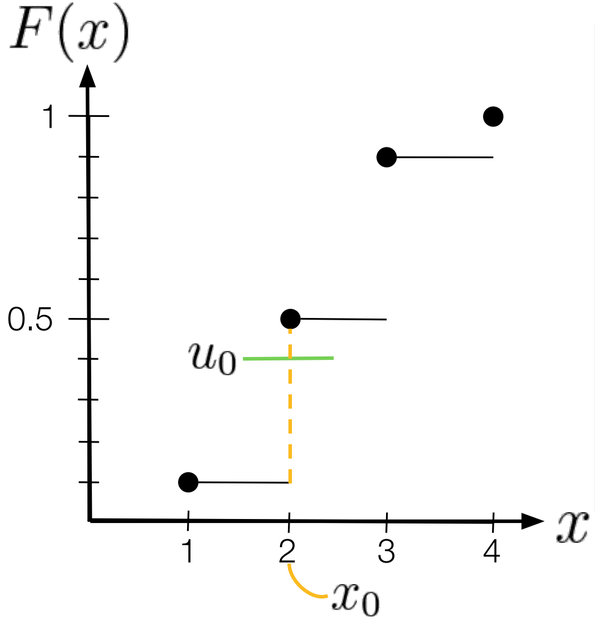
**goal**: approximate *univariate* discrete posterior $p(x),\ x \in \mathbb{N}$

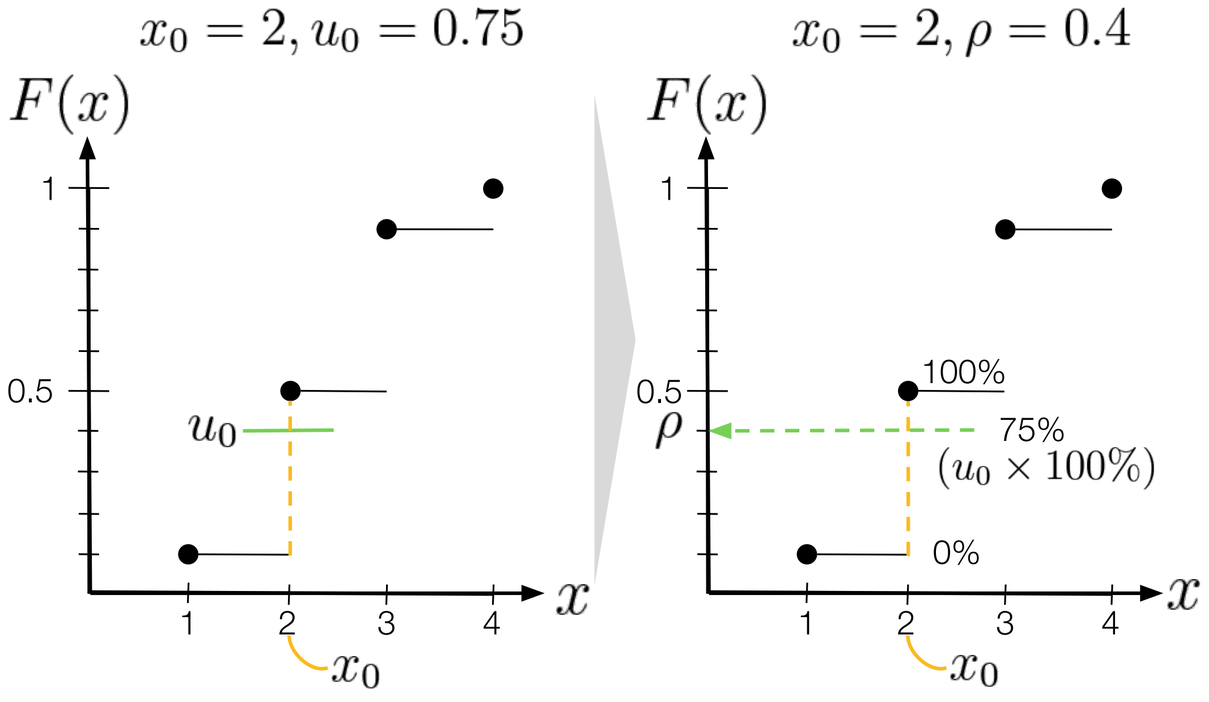
augmented target: $\tilde{p}(x,u) = p(x) \cdot 1_{[0,1]}(u)$

**idea**: use $u$ in inverse-CDF moves to update $x$

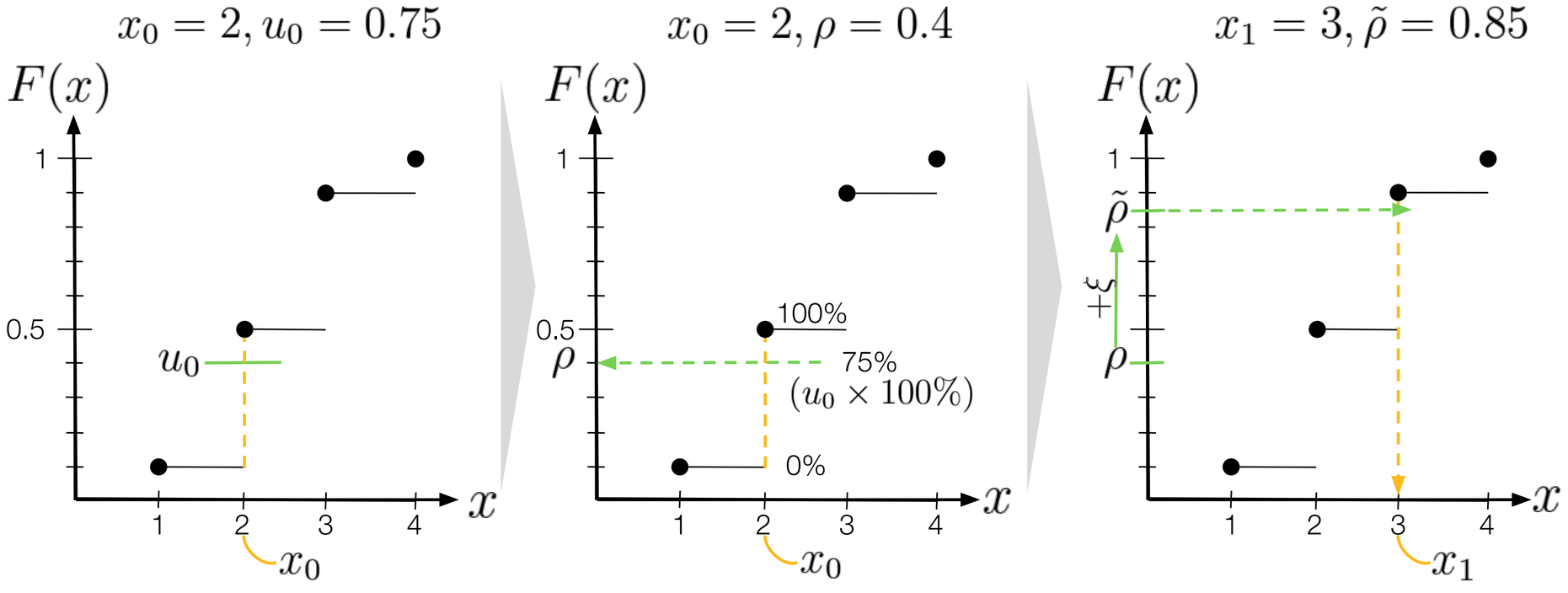
$x_0 = 2, u_0 = 0.75$



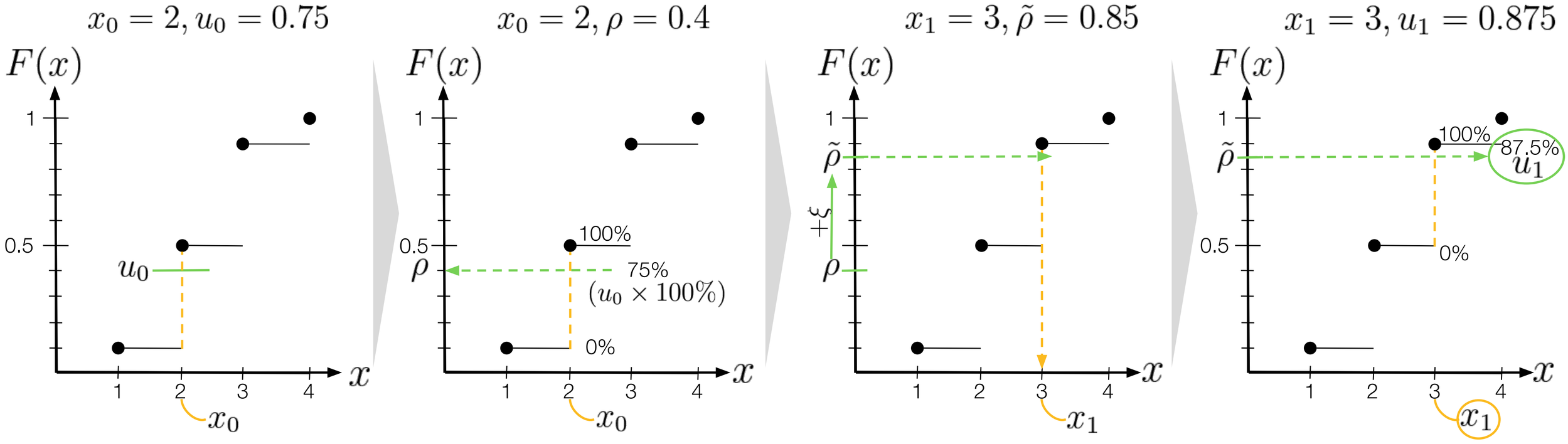

**(0) Initial state**




**(0) Initial state** **(1) $u$-space to $\rho$-space**

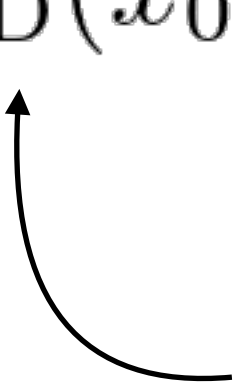



**(0) Initial state** **(1) $u$-space to $\rho$-space** **(2) $x$ update**




**(0) Initial state** **(1) $u$-space to $\rho$-space** **(2) $x$ update** **(3) $\rho$-space to $u$-space**

$$T_{\mathrm{MAD}}(x_0, u_0) = (x_1, u_1)$$



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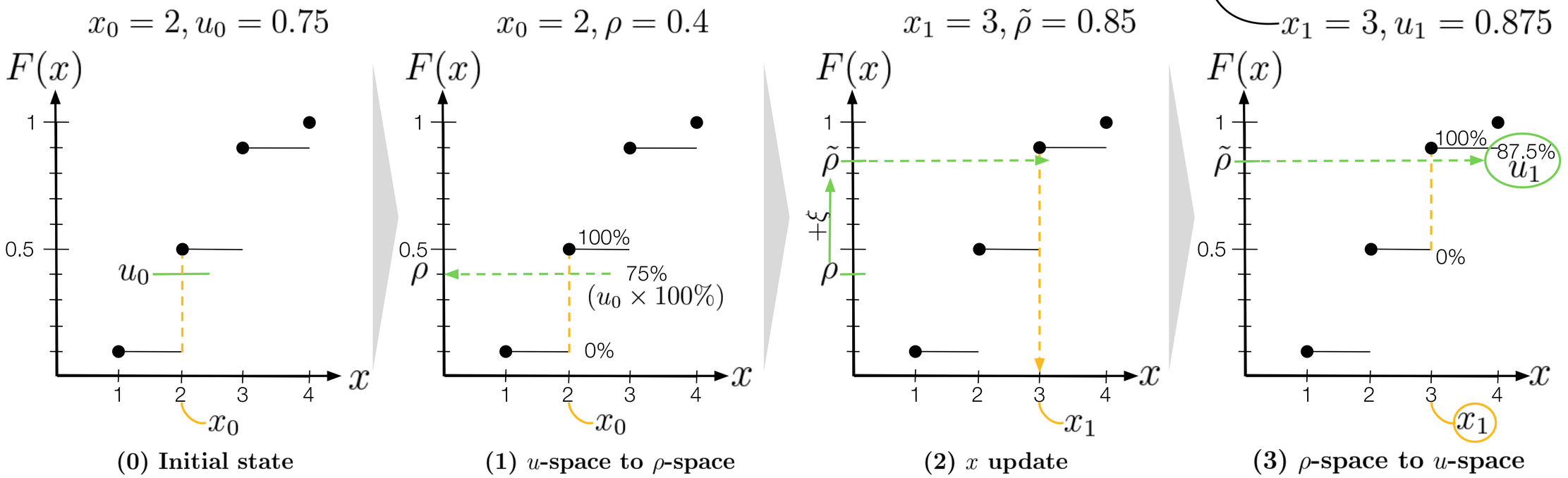

# MAD map for multivariate discrete distributions

**goal**: approximate *multivariate* discrete posterior $p(x),\ x \in \mathbb{N}^M$