

Let  $(\Omega, \mathcal{A}, P)$  be a probability space,  $(\mathbb{R}^l, \mathcal{B}(\mathbb{R}^l))$  a measurable space and  $\epsilon : \Omega \rightarrow \mathbb{R}^l$  a random noise with  $\epsilon \sim p(\epsilon)$  independent of the variational parameter.

Let  $g(\cdot; \psi) : \mathbb{R}^{l+m} \rightarrow \mathbb{R}$  be a Borel measurable function s.t.:

1)  $g$  is a differentiable bijection

2)  $g(\epsilon, \mathbf{x}; \psi) = \mathbf{z}$

where  $\psi$  is the variational parameter. The image of  $g$  depends also on the values of  $\mathbf{x}$  because they are needed to evaluate the reconstruction error.