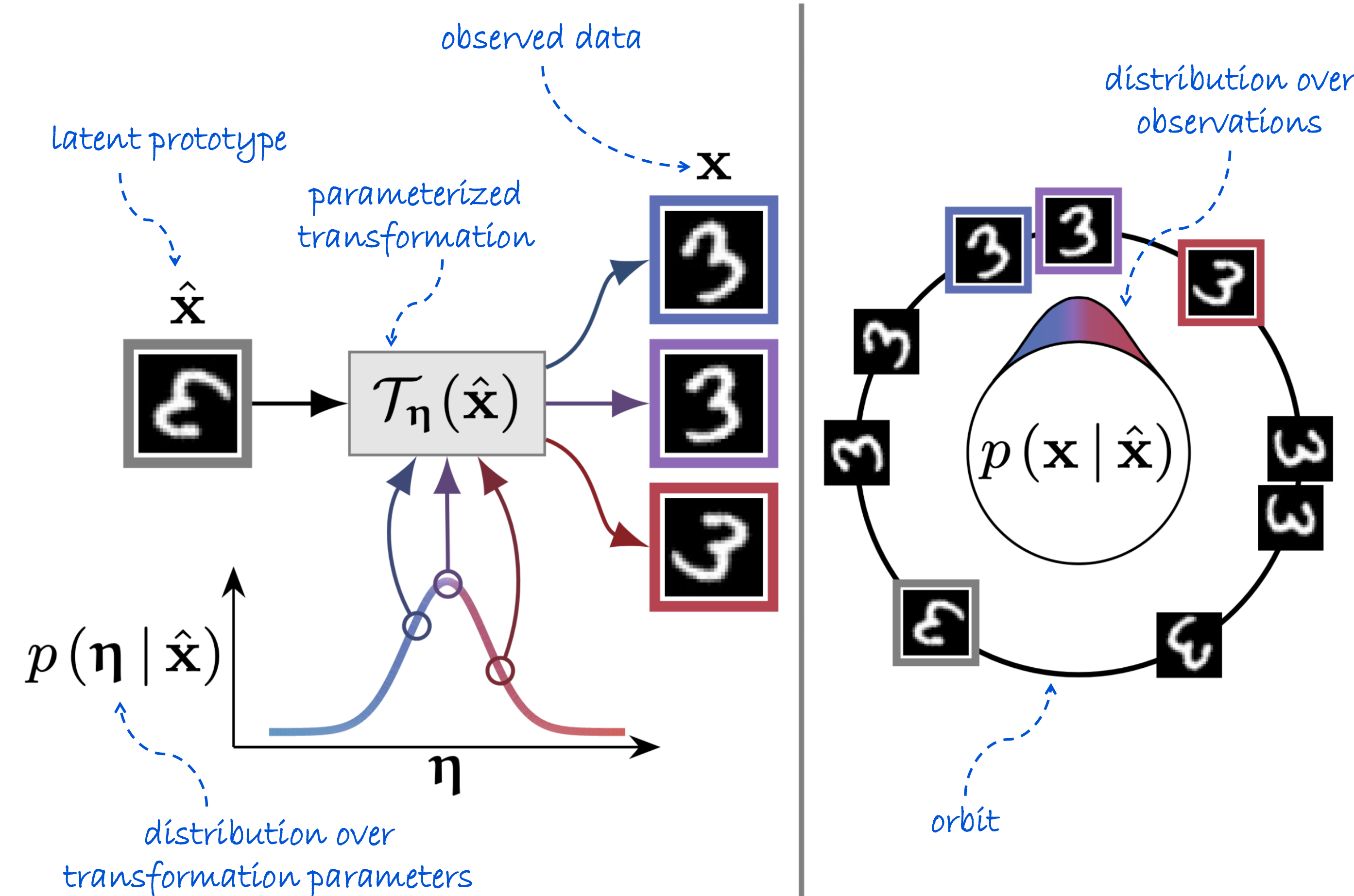


A Generative Model of Symmetry Transformations

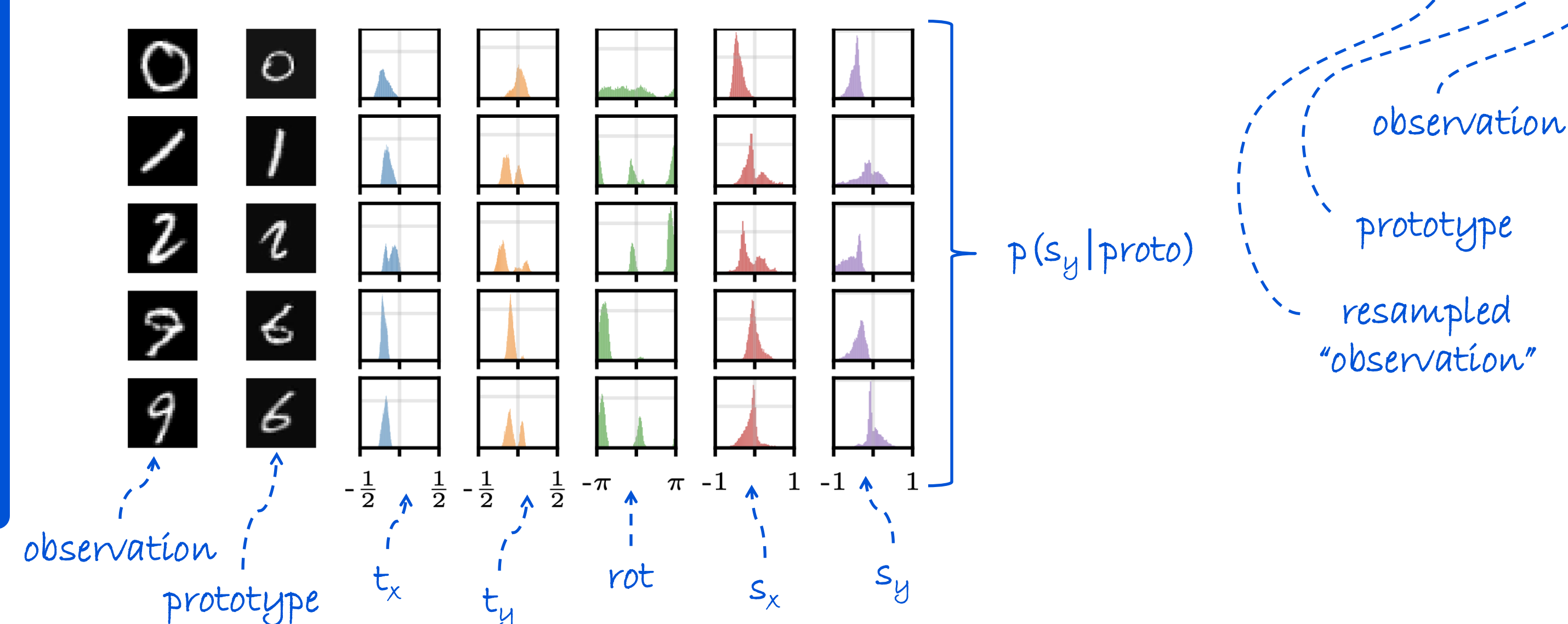
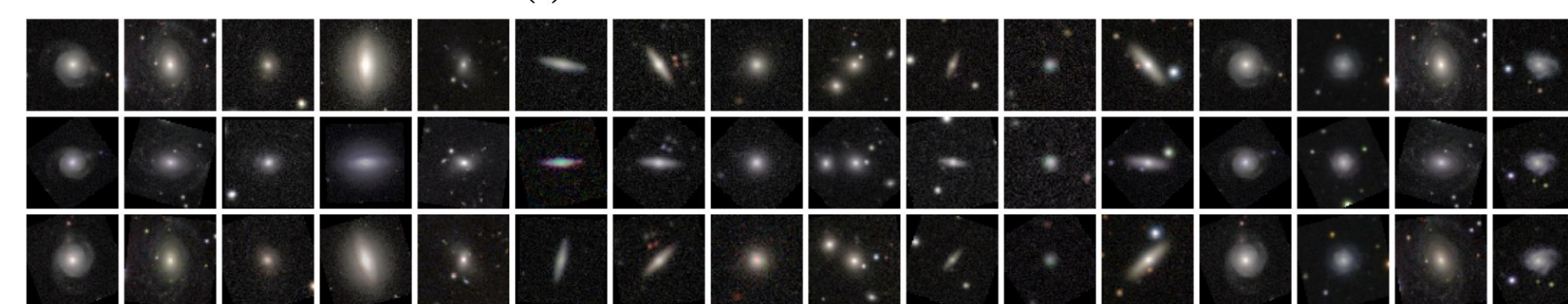
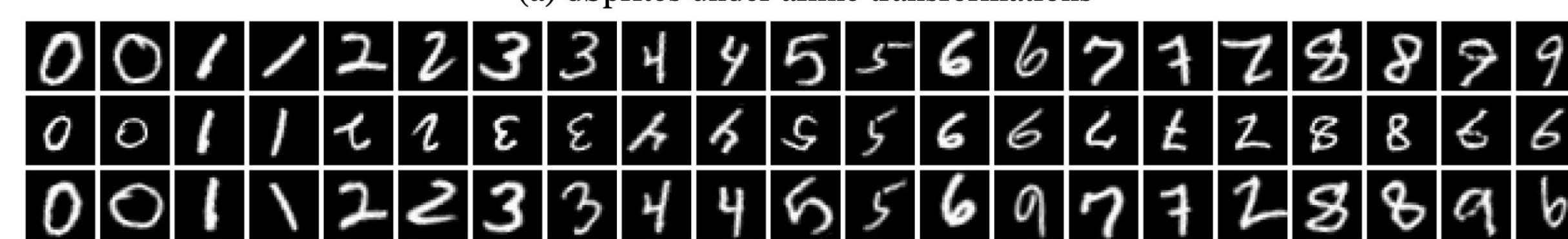
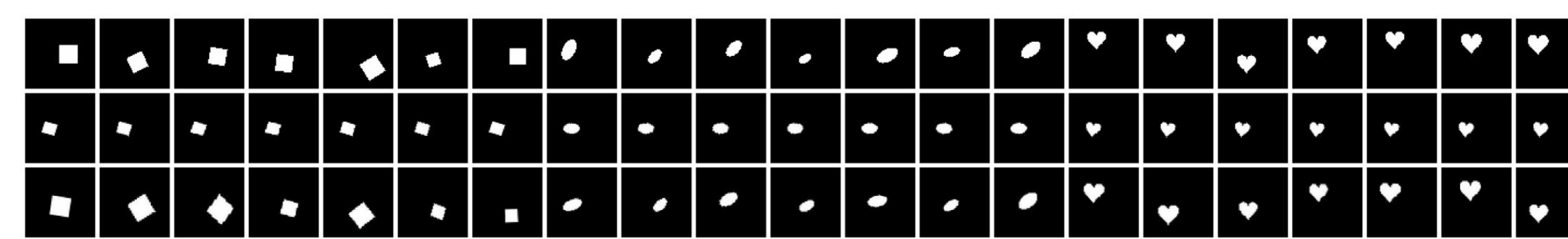
James Urquhart Allingham (jallingham@google.com)¹² Bruno Mlodozienec¹³ Javier Antorán¹ Shreyas Padhy¹ David Krueger¹ Richard Turner¹ Eric Nalisnick⁴ José Miguel Hernández-Lobato¹

We propose a **symmetry-aware generative model**. Our model discovers which (approximate) symmetries are present. We leverage this information to **improve data efficiency**.

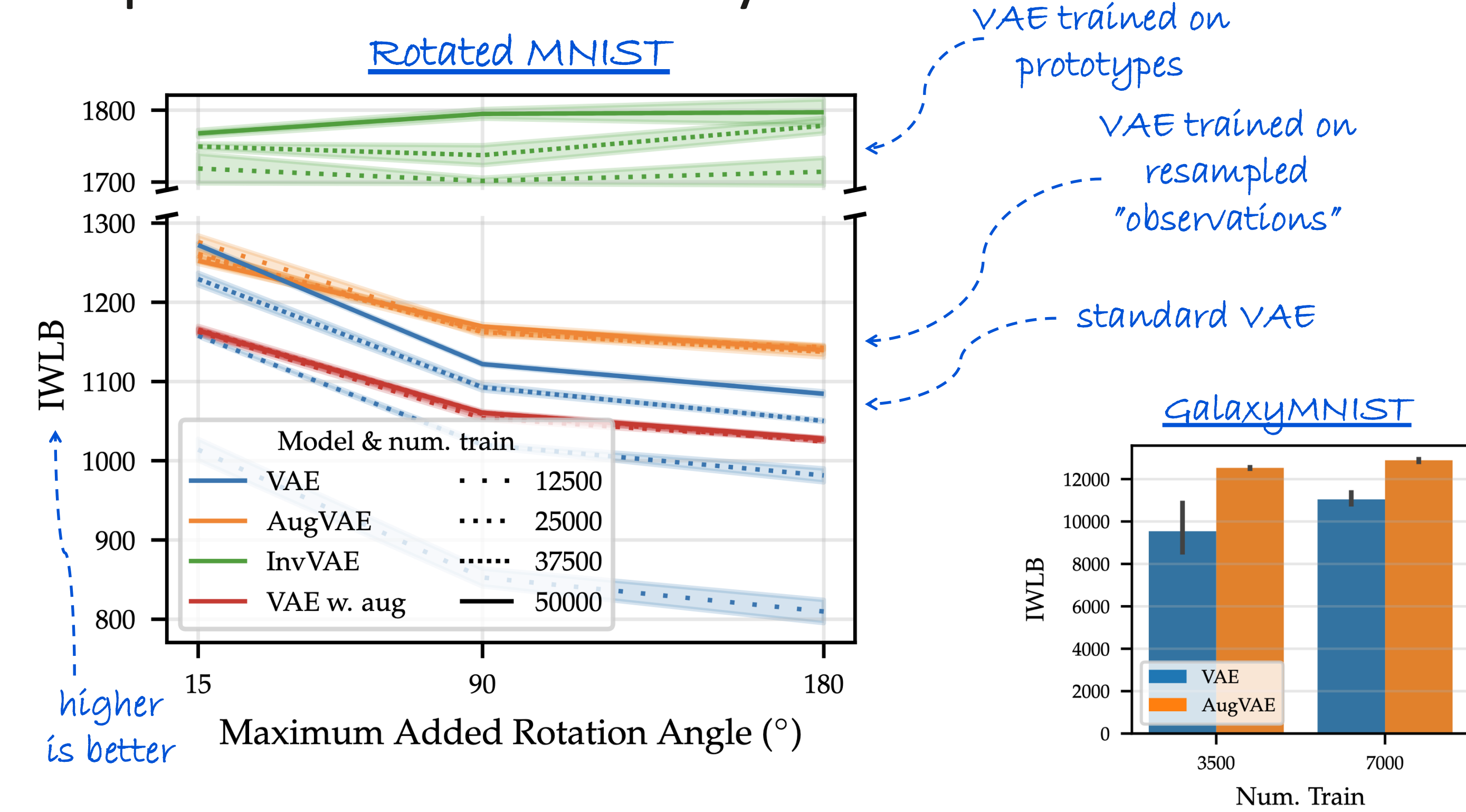
Symmetry Aware Generative Process



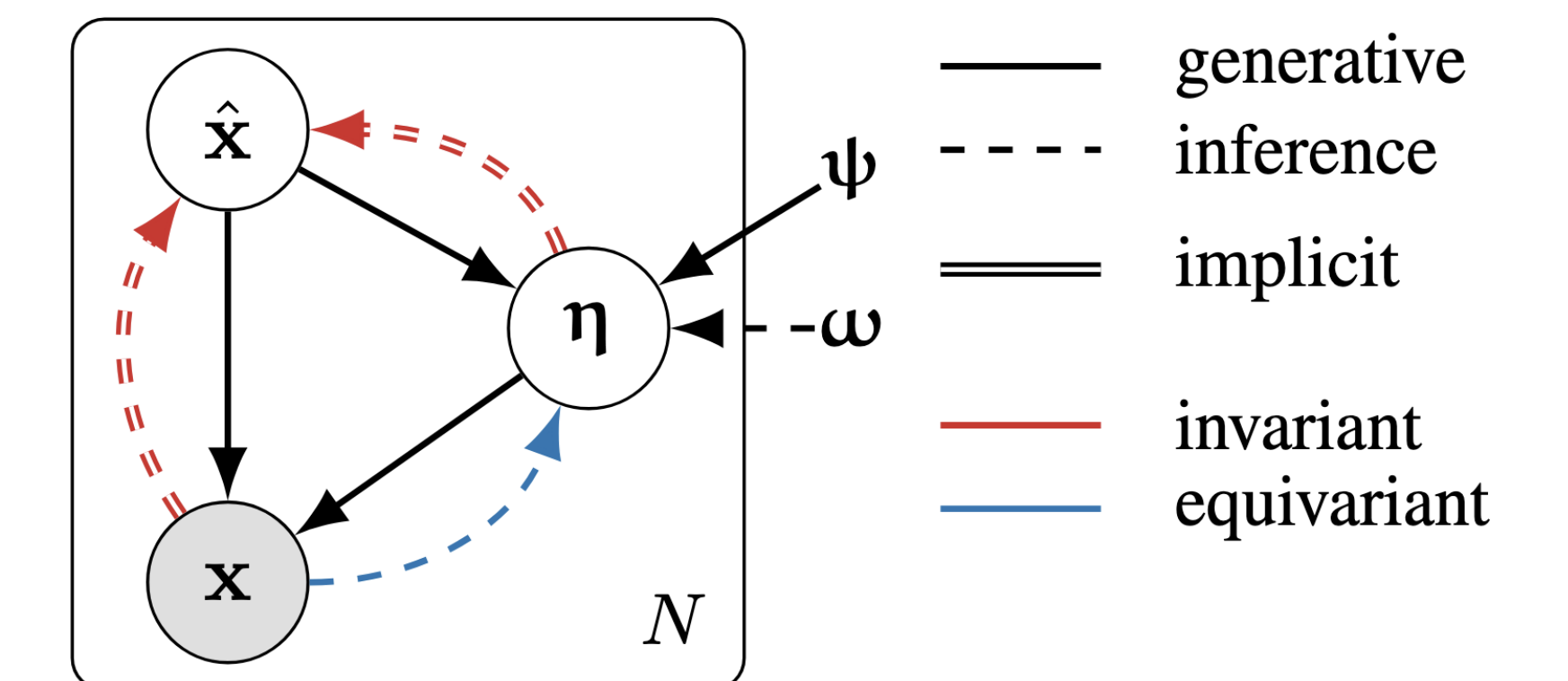
Prototypes and Transformation Distributions



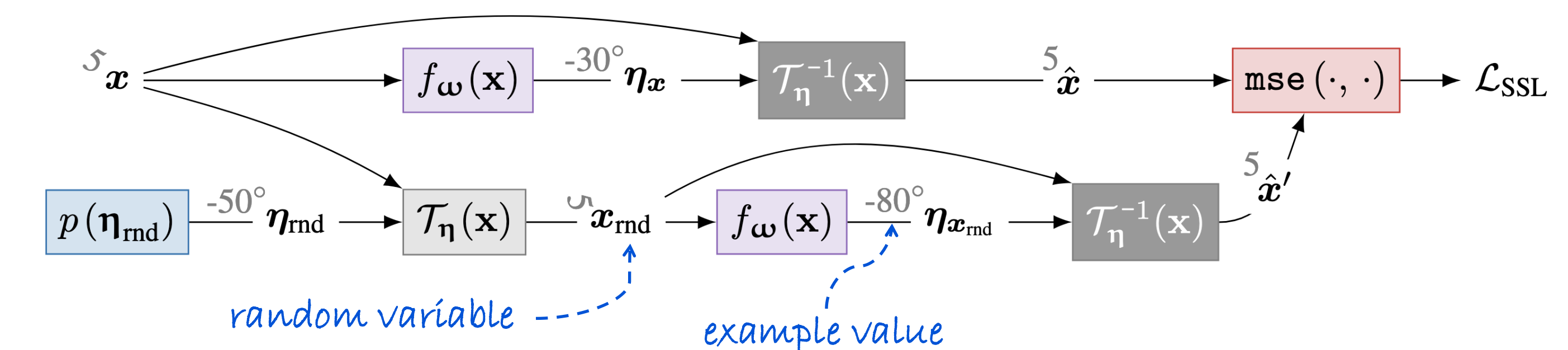
Improved Data Efficiency



Generative Model

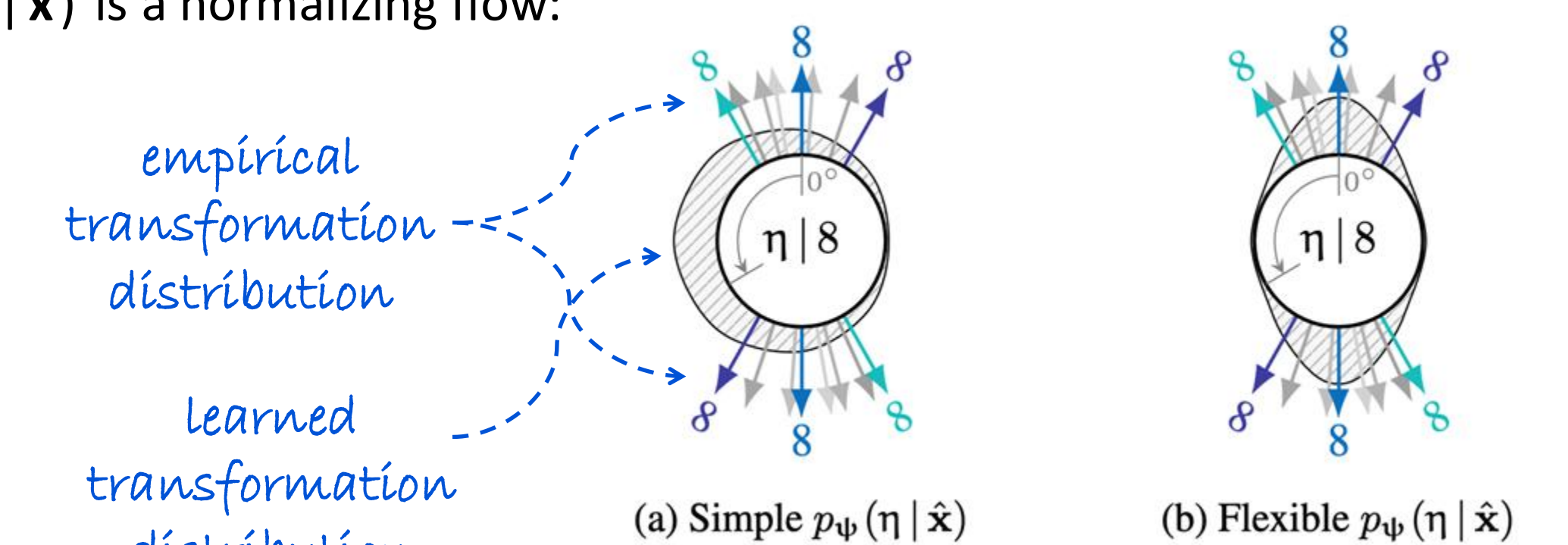


Self-Supervised Prototype Learning

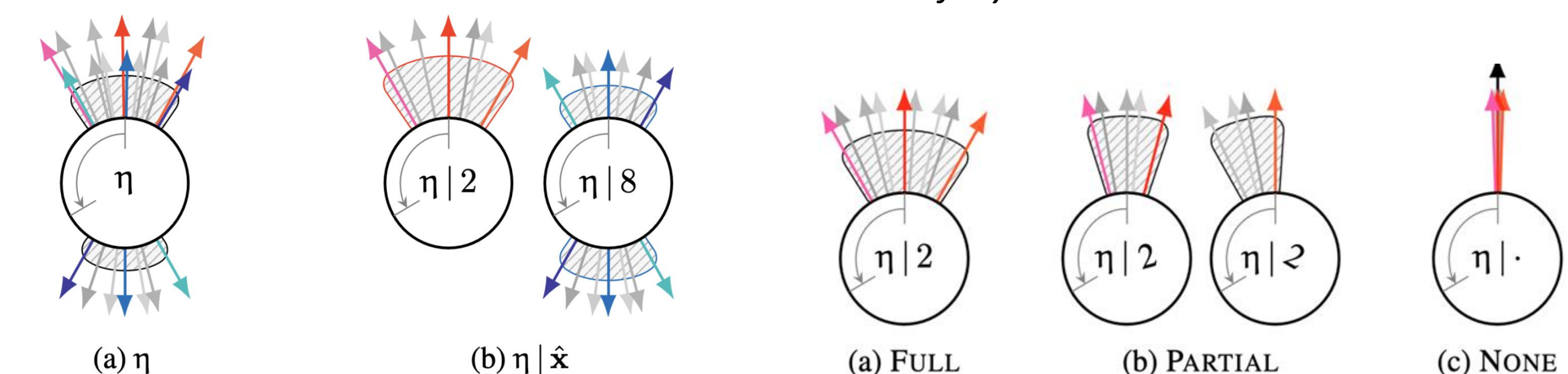


Some Design Choices, Illustrated

1. $p_\psi(\eta | \hat{\mathbf{x}})$ is a normalizing flow:



2. η depends on $\hat{\mathbf{x}}$:



3. $\hat{\mathbf{x}}$ is fully-invariant to transformations:

