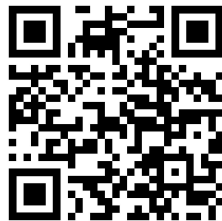# Hybrid Memoised Wake-Sleep

Tuan Anh Le, Katherine M. Collins, Luke Hewitt, Kevin Ellis, N. Siddharth, Samuel Gershman, Joshua B. Tenenbaum

Symbols are important for high-level reasoning

- Communication
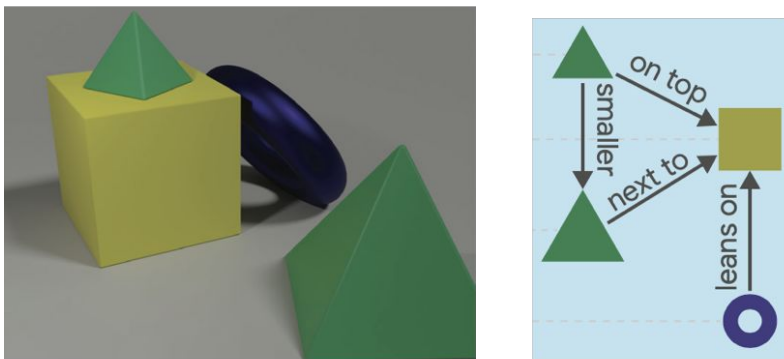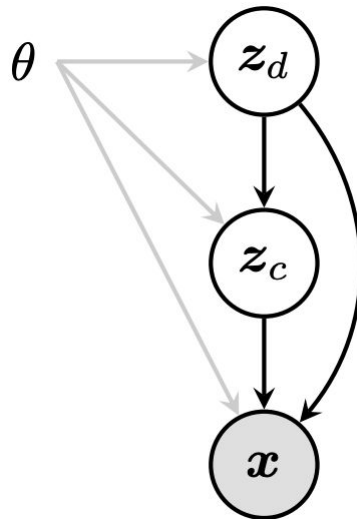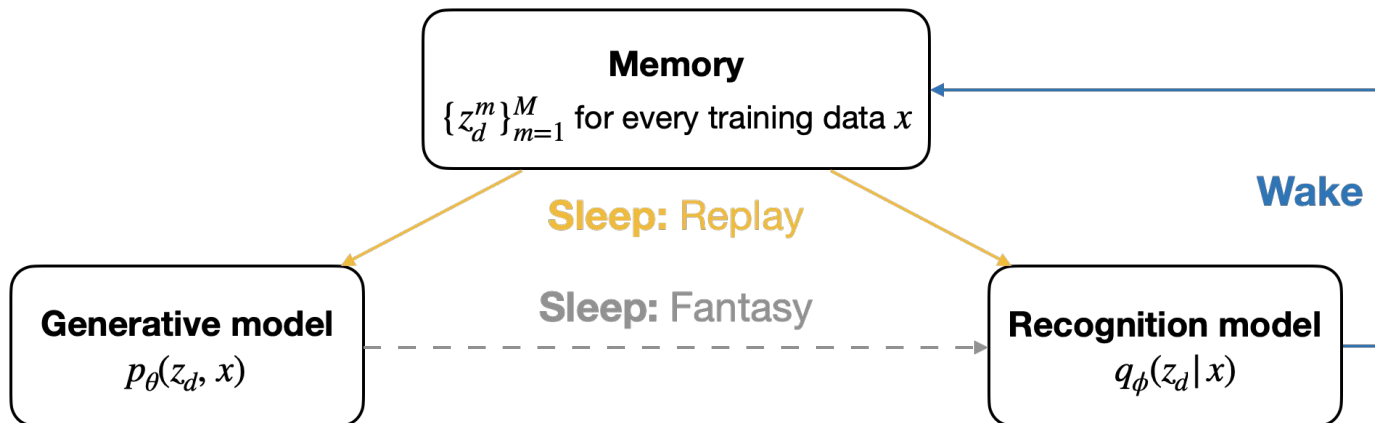- Planning
- Abstract reasoning
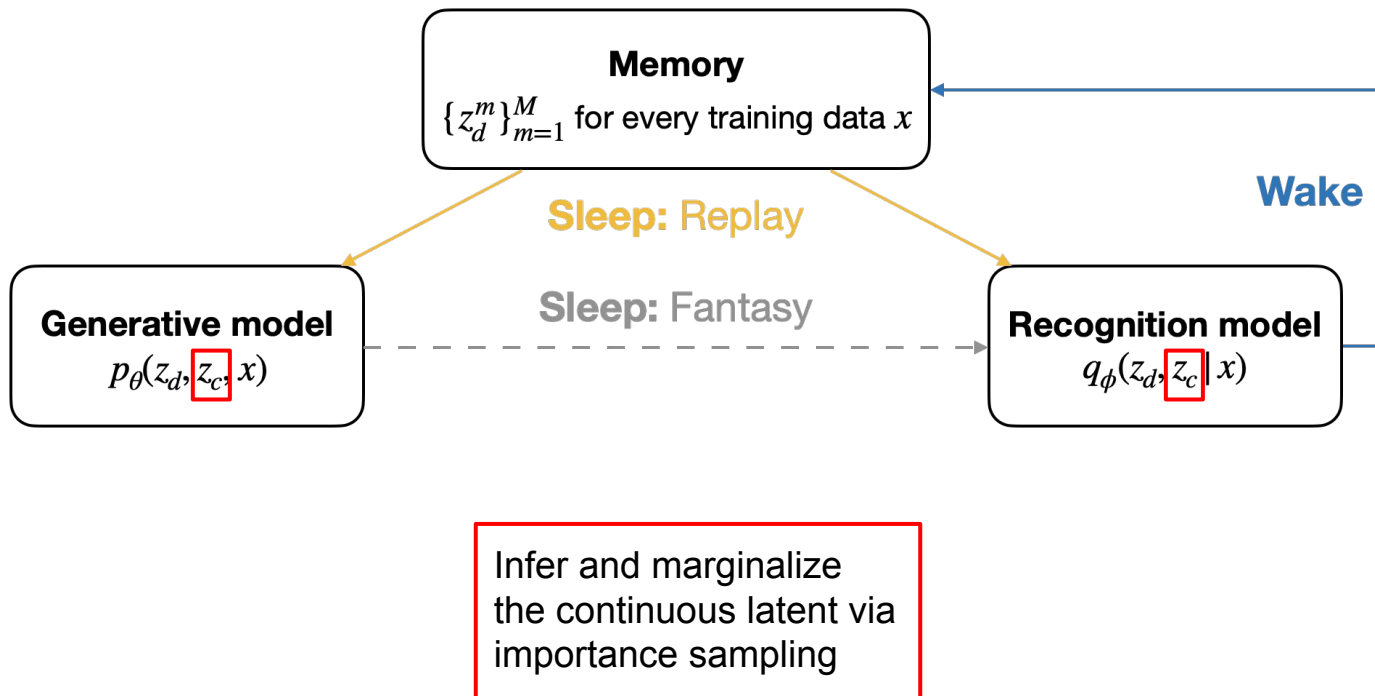

Figure from Greff et al. (2020)

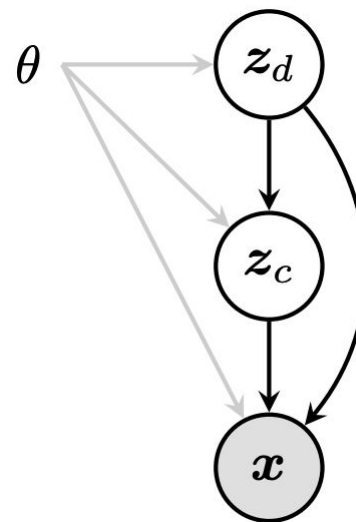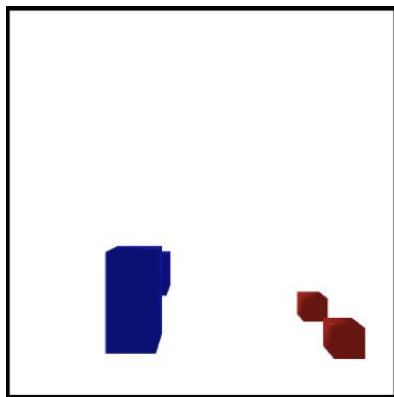# Memoised Wake Sleep only applies to discrete latents

Hewitt, L. B., Le, T. A., & Tenenbaum, J. B. (UAI 2020).
Learning to learn generative programs with Memoised Wake-Sleep.

Hybrid Memoised Wake Sleep extends MWS to hybrid discrete-continuous latent variables

Memory
$\{z_d^m\}_{m=1}^M$ for every training data x

Sleep: Replay

Sleep: Fantasy

Wake

Generative model
$p_\theta(z_d, z_c, x)$

Recognition model
$q_\phi(z_d, z_c | x)$

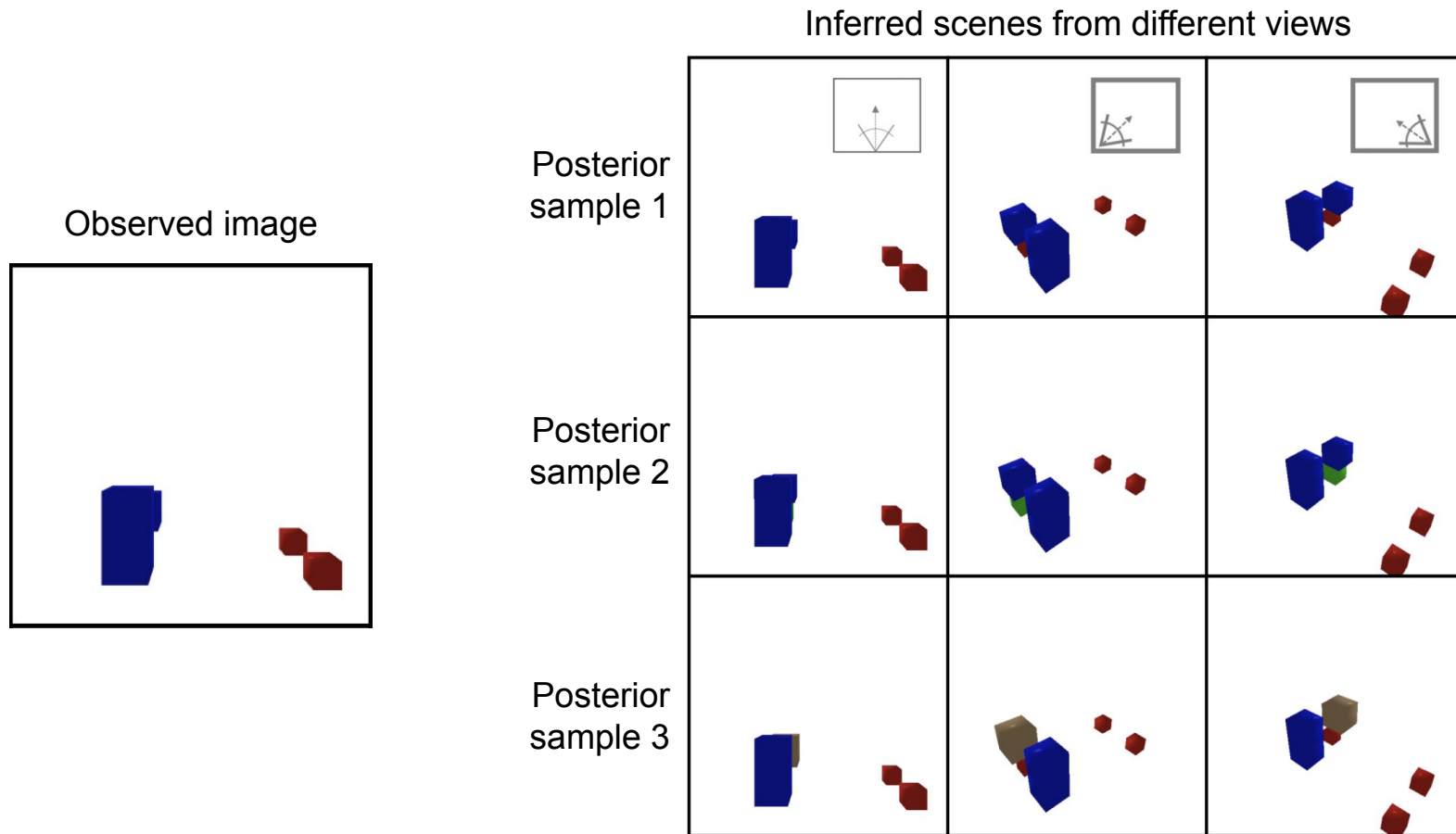Infer and marginalize the continuous latent via importance sampling

HMWS for compositional scene understanding

Observed image

HMWS for compositional scene understanding

Inferred scenes from different views

Observed image

Posterior sample 1

Posterior sample 2
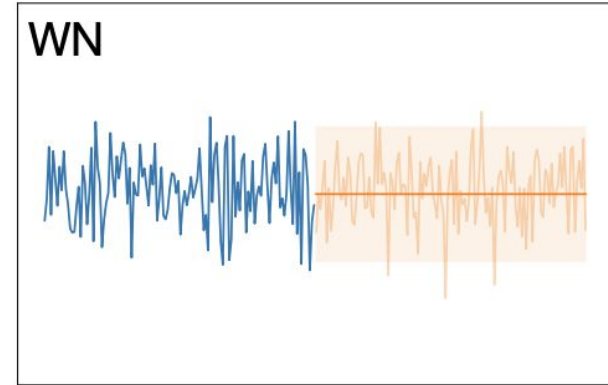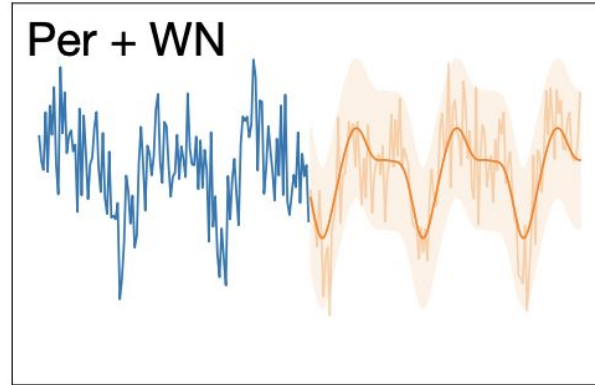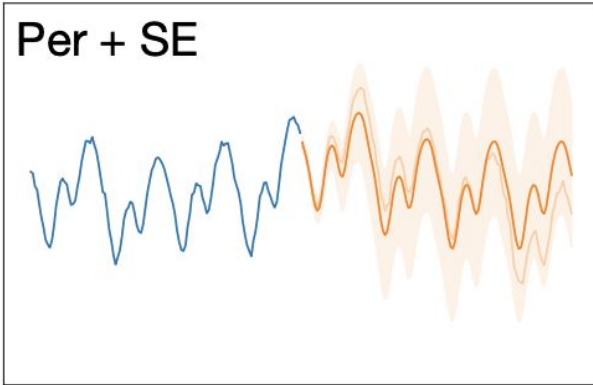
Posterior sample 3

HMWS for structured time series

Per + SE
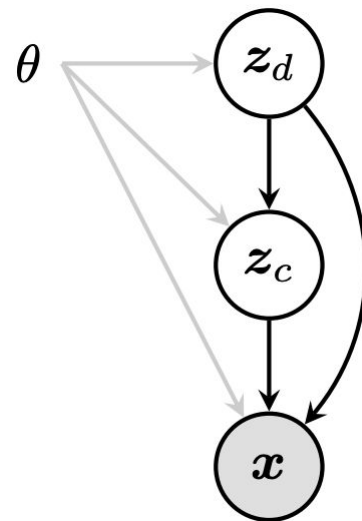
HMWS for structured time series

Hybrid Memoised Wake Sleep

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