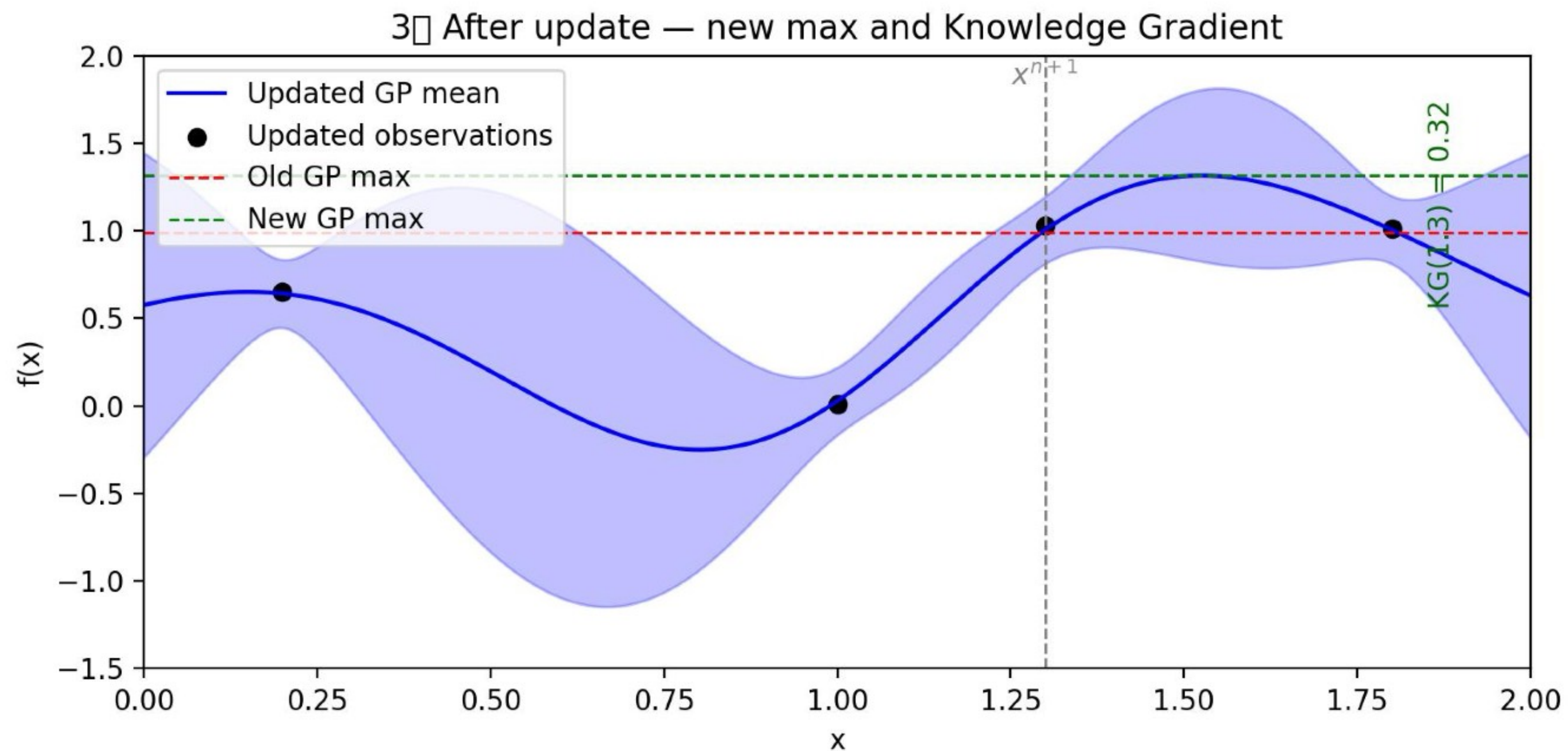


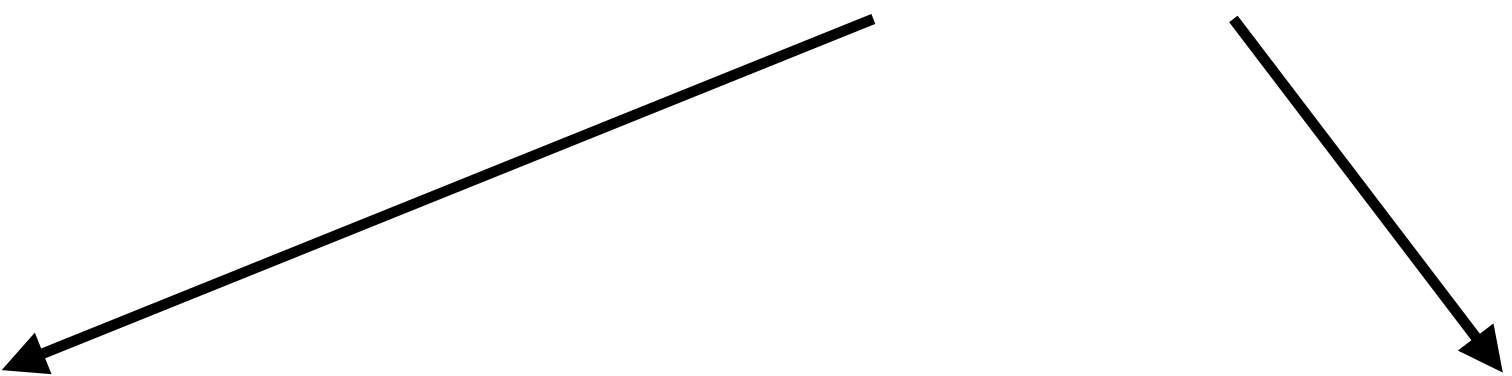
# Monte Carlo Sampling - 3

WuandFrazier2017



# Reparameterization Trick

Reparameterization expresses the new GP mean with the included  $x^{n+1}$  data point  $\mu_y^{n+1}(x)$  using the old GP mean  $\mu_y^n(x)$

$$\mu_y^{n+1}(x) = \mu_y^n(x) + \tilde{\sigma}_y^n(x, x^{n+1}) Z_y, \quad Z_y \sim \mathcal{N}(0,1),$$


Reparameterized covariance coefficient of  $x, x^{n+1}$

$$\tilde{\sigma}_y^n(x, x^{n+1}) = \frac{k_y^n(x, x^{n+1})}{\sqrt{k_y^n(x^{n+1}, x^{n+1}) + \sigma_\epsilon^2}}$$

Introduces randomness to GP posterior sampling

**Notice the new posterior mean is a linear function of  $Z_y$**