Discretization and Linear-Envelope -6
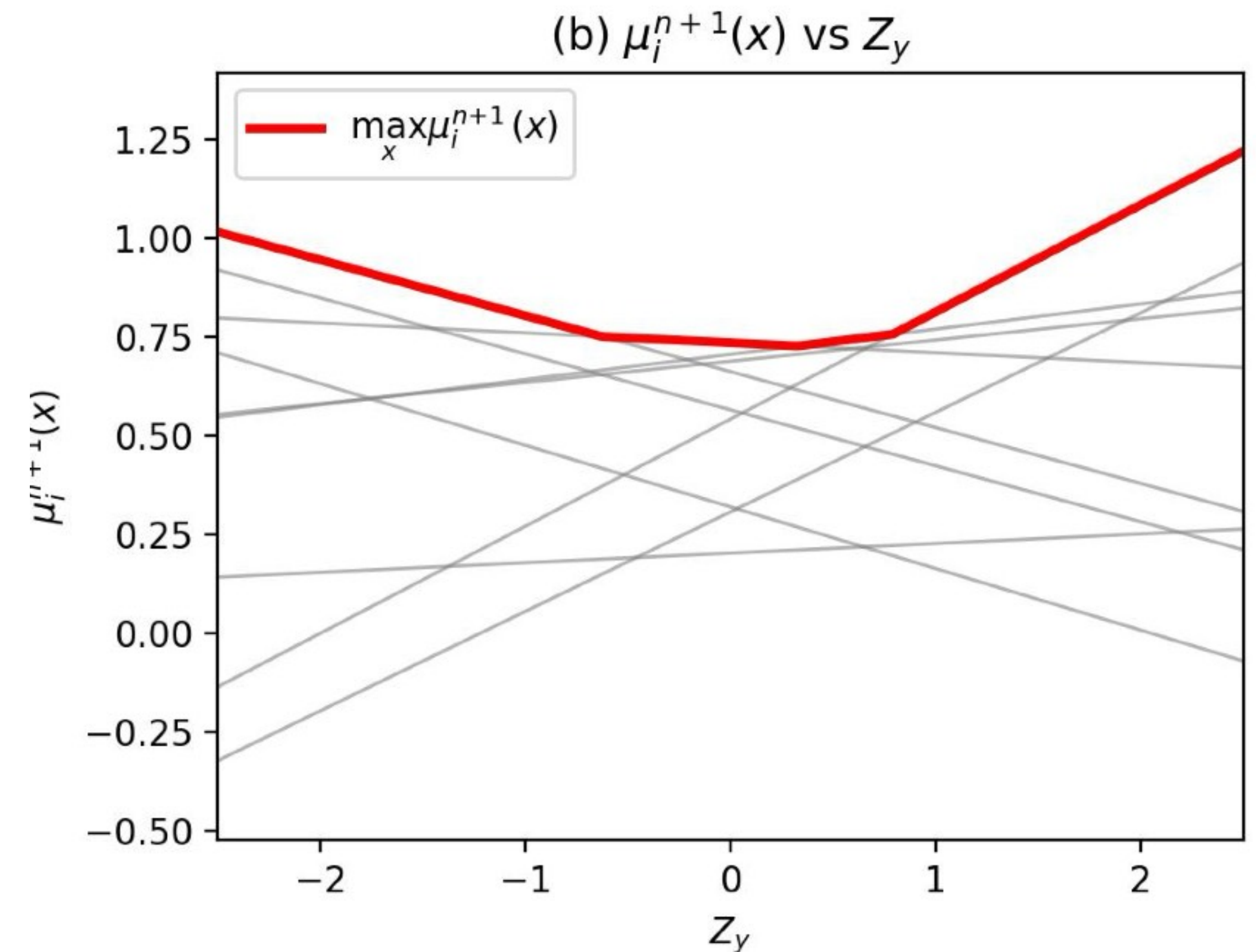
Scott et al 2011

The linear envolope $\max\limits_{x' \in \mathcal{X}_d} \{\mu_y^{n+1}(x')\}$ is parametirized by Z_y which is the probability of that maximum happening.

We can integrate this linear envolope with respect to Z_y to obtain $\mathbb{E}_{Z_y} \left[\max\limits_{x' \in \mathcal{X}_d} \{\mu_y^{n+1}(x')\} \right]$.

Above quantity allows us to compute KG since the max of the old posterior can be taken out of the expectation.

$$KG(x) = \mathbb{E}\left[\max\limits_{x'' \in \mathcal{X}} \{\mu_y^{n+1}(x'')\} \,\middle|\, x^{n+1} = x \right] - \max\limits_{x' \in \mathcal{X}} \{\mu_y^n(x')\}.$$

(b) $\mu_i^{n+1}(x)$ vs Z_y

High Value Linear Envelope -1

Pearce et al. [2020]

- Fixed discretization grows with number of dimensions

- Many of the points don't contribute to the max

- Pearce et al. propose a different way of discretazing the domain where all discretization points contribute to the max and number of points don't grow with number of dimensions