

$$P_{prec@k}(i) := \begin{cases} 1/k & \text{if } i \leq k \\ 0 & \text{otherwise} \end{cases}$$

$$\mathbb{E}_{P_{prec@k}}[R(\vec{r})] = \sum_{i=1}^{|\vec{r}|} P_{prec@k}(i) \cdot r_i$$

$$= \sum_{i=1}^k \frac{1}{k} r_i$$

$$= \frac{1}{k} \sum_{i=1}^k r_i$$