How bad is it?

- Linear POMDP: believe state - $O_t = h_t(S_t, A_t, W_t)$
  - ➡ Static output feedback is NP hard (linear in O_t and dynamics)
  - ➡ General POMDPs are PSPACE hard
- There are ways out - separation principle:
  - ➡ Filtering $\hat{s}_t = f(\{o_t\})$ - prediction problem
  - ➡ Action based on certainty equivalence
  - ➡ Optimal filtering - if dynamics are linear and noise is Gaussian - Kalman filtering - general belief propagation - LQG
  - ➡ Kalman filtered state - optimal in estimation and control
  - ➡ Estimate state with prediction $S_t = h(\tau_t)$, τ_t are time lags

POMDPs and non stationarity