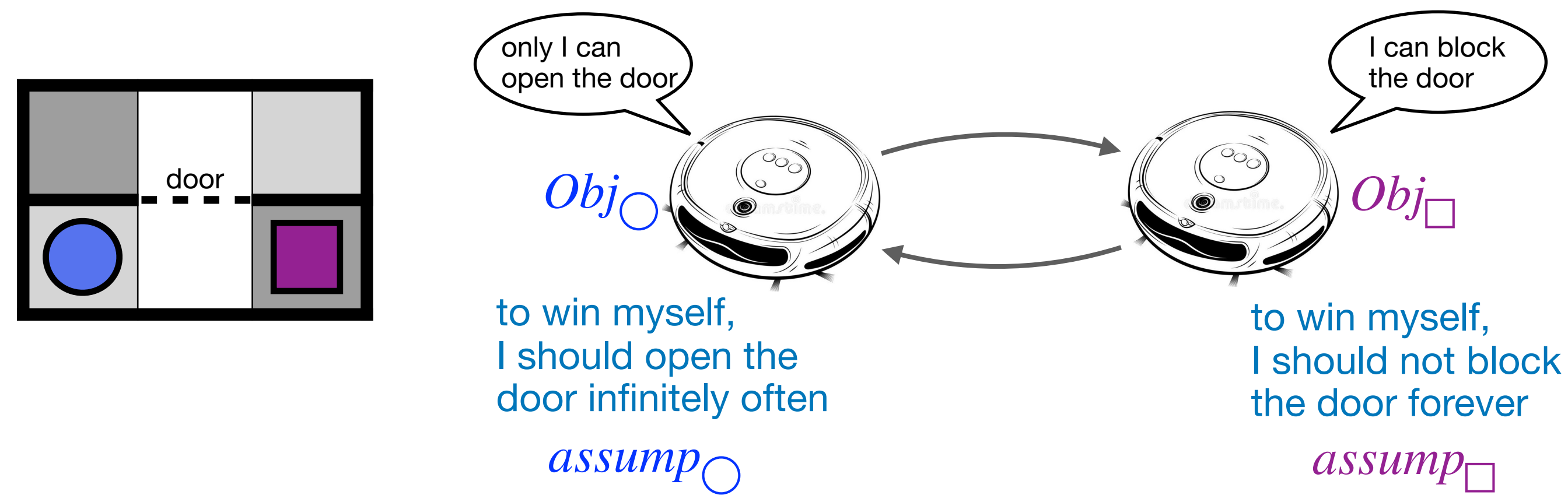


Most General Winning Secure Equilibria Synthesis

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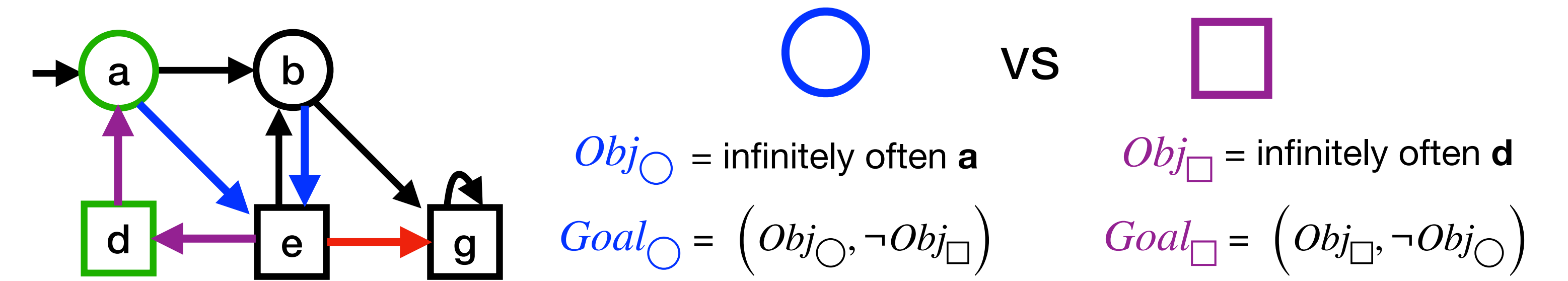
Rational Robots in a Workspace



Secure equilibrium (SE) = cooperative strategy + punishment strategy
 alternately use the middle passage block the door forever

How to **generalize secure equilibria** to have more **flexibility** for the systems?

Rational Players in a Graph Game



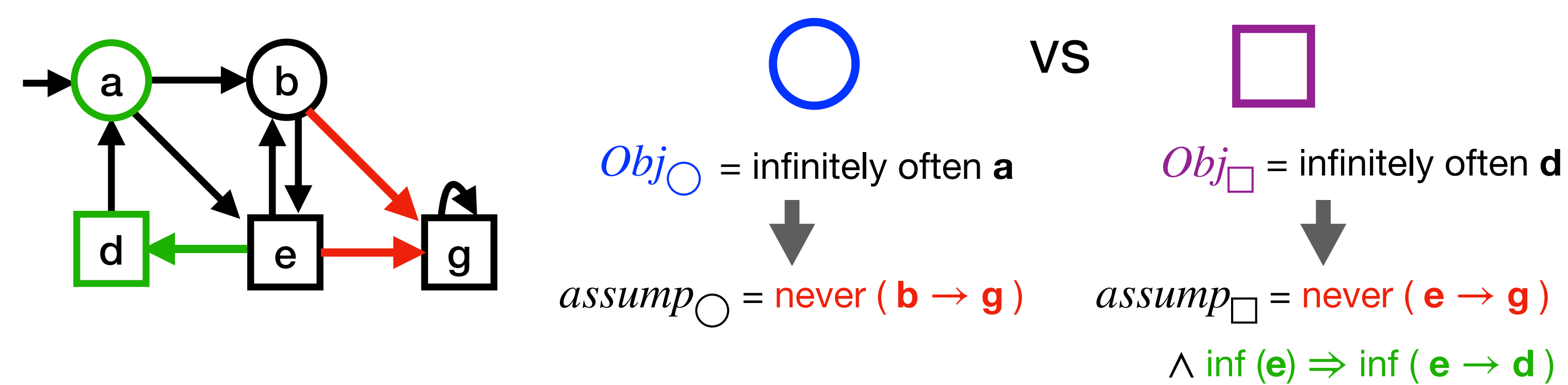
Winning Secure equilibrium (WSE)
 (Str_O, Str_S)

- ▶ $(Str_O, Str_S) \models$ both win
- ▶ $Str_O \models$ \bigcirc loses \Rightarrow \square also loses
- ▶ $Str_S \models$ \square loses \Rightarrow \bigcirc also loses

cooperative strategy + punishment strategy

$$Str_O^c : \begin{array}{l} \dots a \rightarrow e \\ \dots b \rightarrow e \end{array} + Str_S^p : \begin{array}{l} \dots e \rightarrow d \\ \dots d \rightarrow a \end{array}$$

Most General Winning Secure Equilibria



Most General WSE

$$(\Psi_O, \Psi_S)$$

- ▶ $\Psi_O \wedge \Psi_S \equiv Obj_O \wedge Obj_S$
- ▶ each Ψ_i is realizable by Player i
- ▶ every (Str_O, Str_S) with $Str_i \models \Psi_i$ forms a **WSE**

$$\Psi_O = assump_O \wedge (assump_S \Rightarrow Obj_O) = assump_O$$

$$\Psi_S = assump_S \wedge (assump_O \Rightarrow Obj_S) = assump_S$$

Contribution

- most general WSE = collection of equilibria as **independently** realizable specifications
- **sound** and **efficient** but incomplete algorithm
- generalized to k-player games (even with **Env**)

Future Works

- extend the notion to other equilibria, e.g., subgame-perfect equilibria
- quantitative settings

