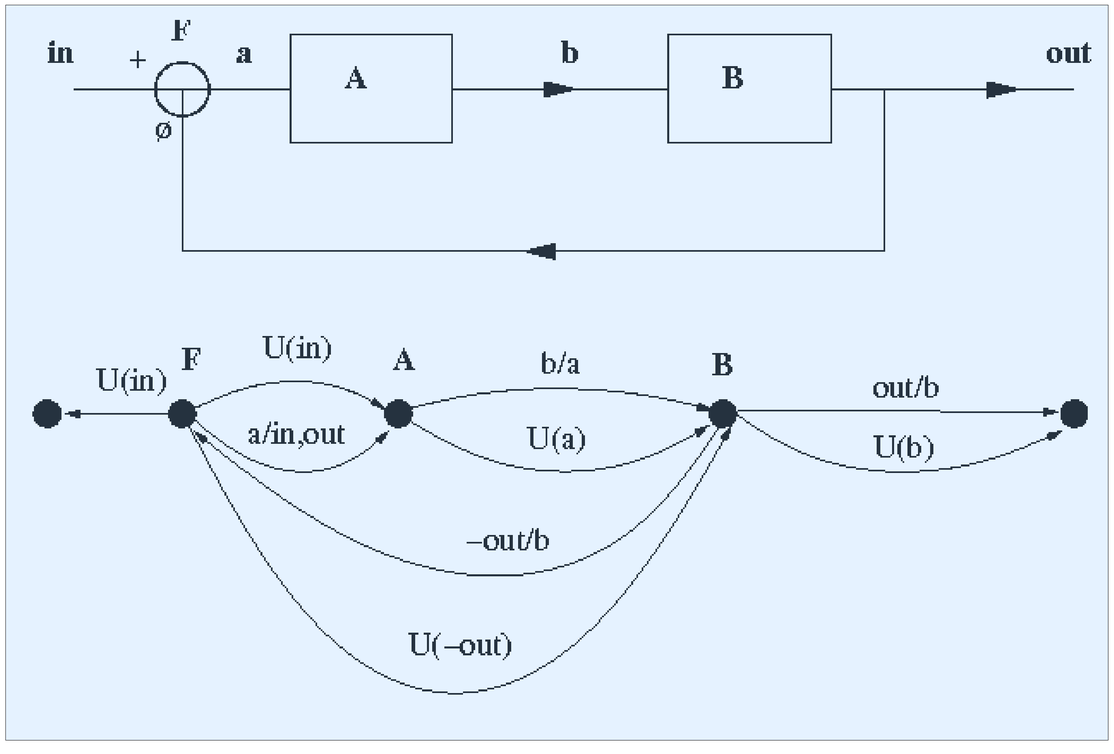
Promise theory – control theory 4 high level?

Autonomous promises

How can one predict the behaviour of systems that one does not control? Autonomous components in a network are controlled from many different sources. Promise theory allows us to understand interacting components that can make autonomous decisions, including the decision to cooperate with neighbouring components. This is a more realistic model for "wide area" systems.



Compare the interaction relations for a control view and a promise view.

$$
\begin{aligned}
A : \mathrm{out}(t) &= \int B(\tau) b(t-\tau) d\tau \\
B : \quad b(t) &= \int A(\tau) a(t-\tau) d\tau \\
F : \quad a(t) &= \mathrm{in}(t) - \mathrm{out}(t).
\end{aligned}
$$

- $F \xrightarrow{\pi_a} A$ where $\pi_a : a(t) = \mathrm{in}(t) - \mathrm{out}(t)$ if out is promised.
- $A \xrightarrow{\pi_b} A$ where $\pi_b : b(t) = \int A(\tau) a(t-\tau) d\tau$ if a is promised
- $B \xrightarrow{\pi_{\mathrm{out}}} A$ where $\pi_{\mathrm{out}} : \mathrm{out}(t) = \int B(\tau) b(t-\tau) d\tau$, if b is promised.

Notice how control theory assumes that the parts will do "as they are told" while promise theory makes no such assumption. For that reason the promise approach is more complex, but also more realistic if the components are autonomous agents, perhaps belonging to quite different organizations, in a pervasive world.