

Let's interplay!

Does co-evolution enable or constrain?

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GBI

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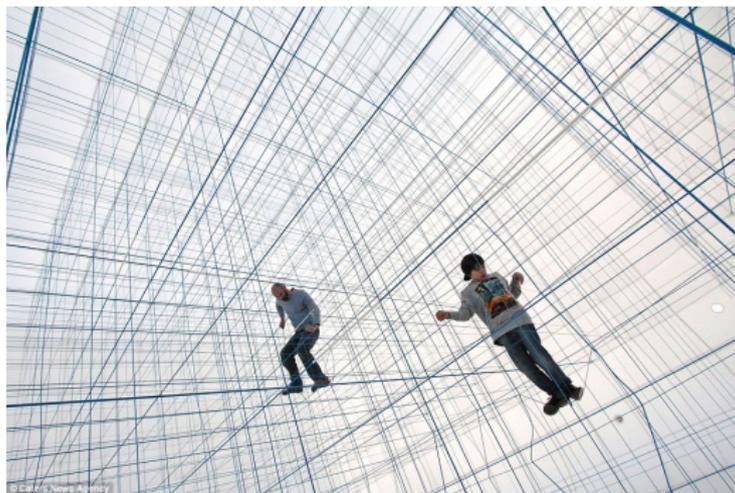
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Interplay

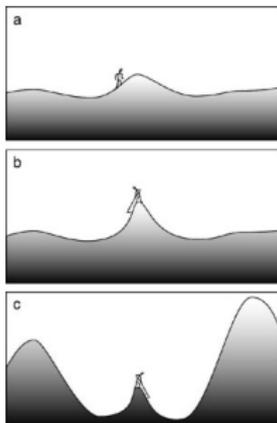


Perils



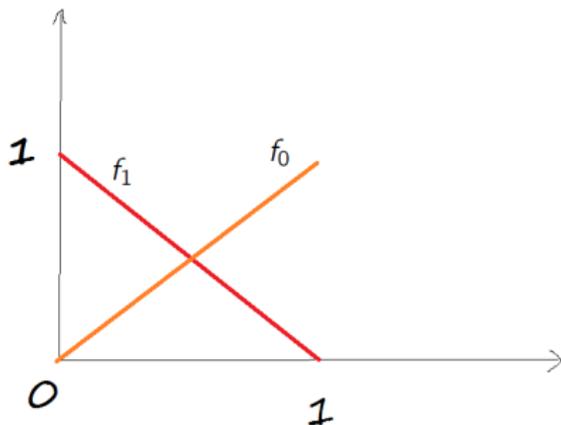
- Agents form structure, but this structure dictates agents
- not necessary wanted: addiction/ supernormal stimuli; state
- Technology
- Democracy

Classical evolution vs co-evolution



- classical: fixed fitness landscape: $f(x)$
- co-evolution: fitness landscape changes as you move along it: $f_{\bar{x}}(x)$, with \bar{x} from previous x 's, or x 's from other agents

Classical evolution vs co-evolution: example



$$f_0(0) = 0; \quad f_0(1) = 1$$

$$f_1(0) = 1; \quad f_1(1) = 0$$

Socio-technological

- agents A_i with fitness $f(x_i)$
- positive feedback: $f(x_i)$ higher \rightarrow more influence on f :

$$f(x_i) \leftarrow f(x_i) + k \cdot f(x_i)$$

$$f(x_j) \leftarrow f(x_j) - \frac{k}{n-1} \cdot f(x_i) \quad \forall j \neq i$$

Opposition

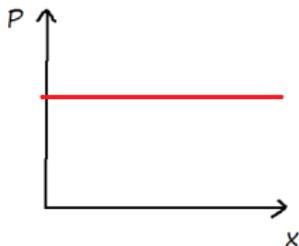
- General positive feedback model
- Opposition: don't take from all, but from the one with biggest fitness

$$f(x_j) \leftarrow f(x_j) - k \cdot f(x_i) \quad \text{for } j : f(x_j) \text{ max}$$

Link with second law of thermodynamics

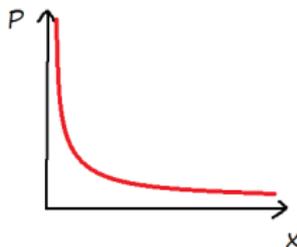
Second law of thermodynamics

without selection, system goes to maximal entropy

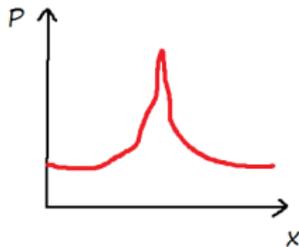


Constant opposition

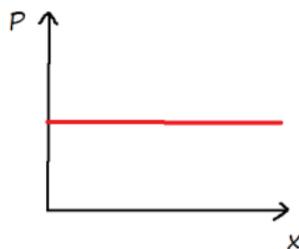
"Those with power, will get more"



with selection

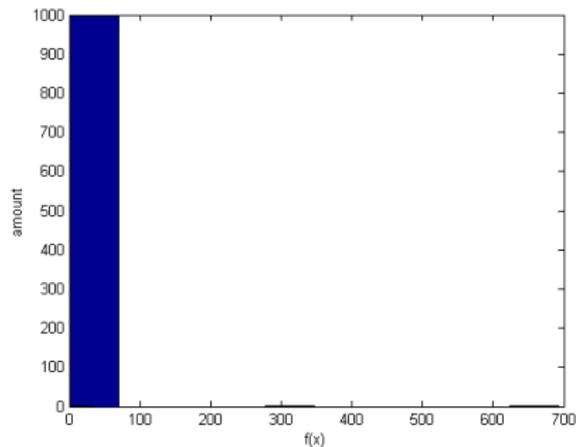


Unless there is selection mechanism: opposition to those with power

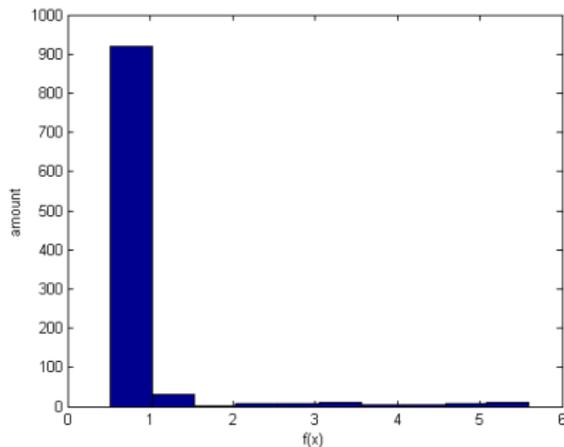


Result

Classical:

Median= $4.0924e - 067$

With resistance:

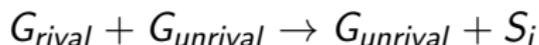
Median= 0.8646

Principles

- Method= reaction(s)
- Goal(s)= Organization/ products of reactions
- Method emerges in certain environment, to reach goal. This environment evolves

Agent model

- Agent has goal set $G_i = G_{rival} + G_{unrival}$:



- Agent choose method(s) (reactions) to reach goal (is catalyst)
- Organisation (hopefully) emerges
- Mutation \rightarrow are the goals still reached?

From exploiter to cultivator

- exploiter: monopolizes resources, predator ($A \rightarrow 0$)
- (evolves to) cultivator: builds organisation that overproduces A, so it can take it ($A \rightarrow 0$)
- not necessary "good" for agents in it

From exploiter to cultivator: example

$Worker + Time_W \rightarrow Worker + Good$

$Good \rightarrow Money$

$Capitalist + Money \rightarrow Capitalist + Money_C$

exploiter \rightarrow cultivator by adding

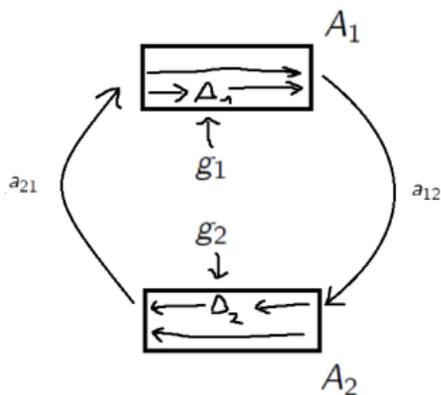
$Time + \epsilon Money \rightarrow Time_W + \epsilon Money_W$

while there is a constant input of time:

$\emptyset \xrightarrow{cst} Time$

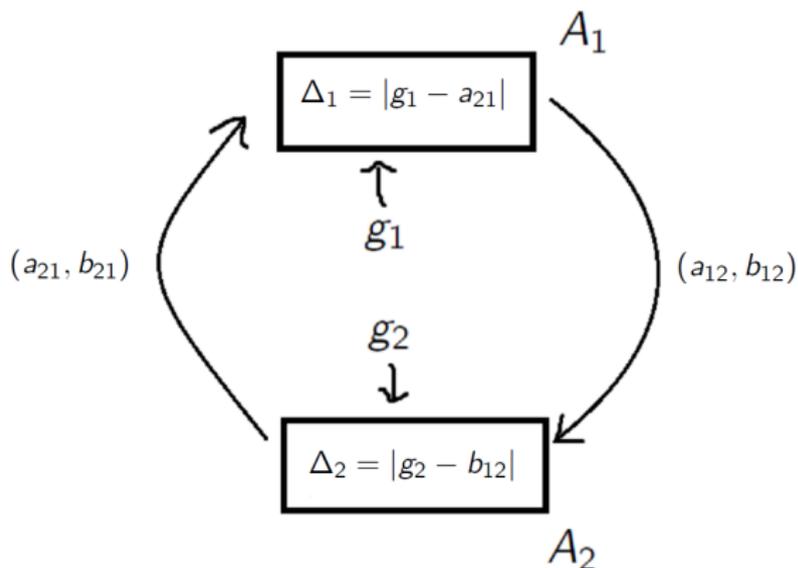
A definition

Power: ability to act: how much result you got from a different action

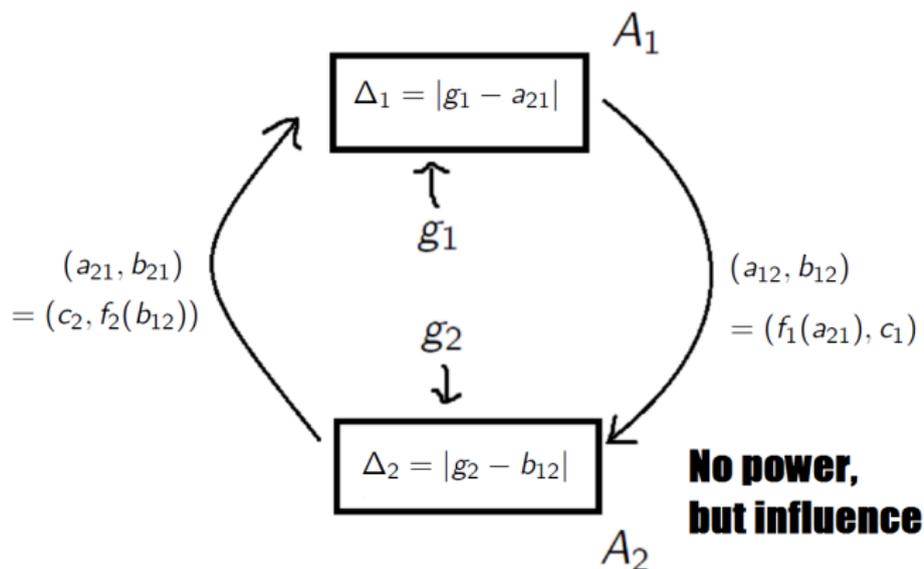


$$\text{Power of } A_1 = \frac{d\Delta_1}{da_{12}}$$

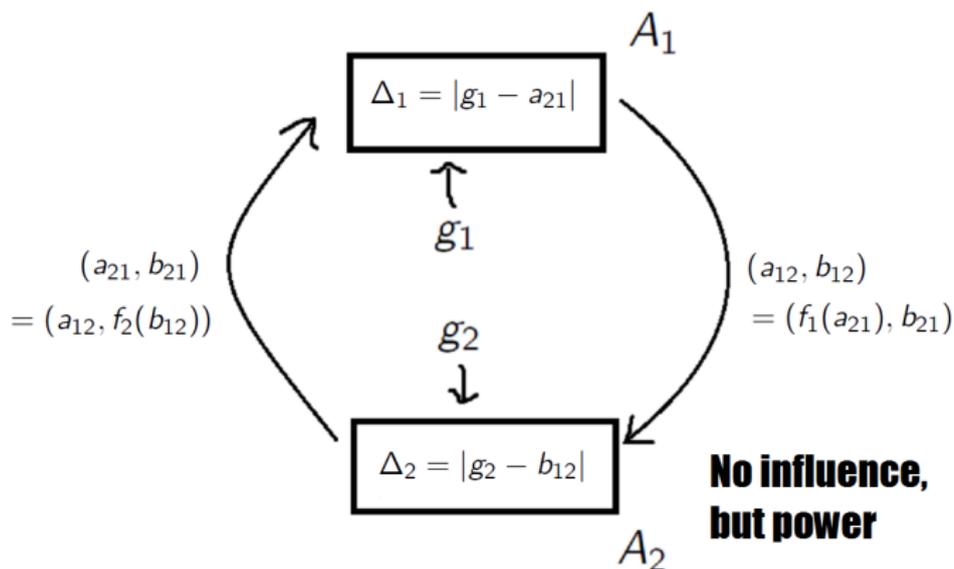
Power vs influence: examples



Power vs influence: examples



Power vs influence: examples

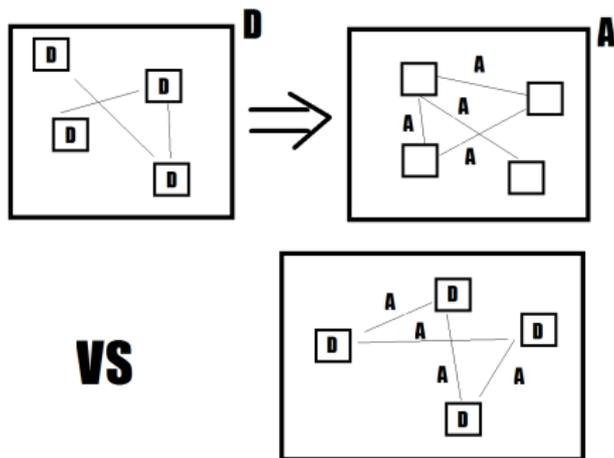


$$\left(\underbrace{v_1, \dots, v_i}_{\text{Independent goal space A}}, \underbrace{v_j, \dots, v_k}_{\text{Intersecting goal space A and E}}, \underbrace{v_l, \dots, v_m}_{\text{Independent goal space E}}, \dots, v_n \right)$$

- Several preferred states + variables depend on each other
- Power, "Imposing structure" = No act of A can put it out of attractor → no influence on it (but matters)
- Can't really look to goal A independent of goal E, because connected (nature/nurture problem)

Democracy

Division of decision and acting



Necessity to make a (global) decision?

Example: neighbourhood formation

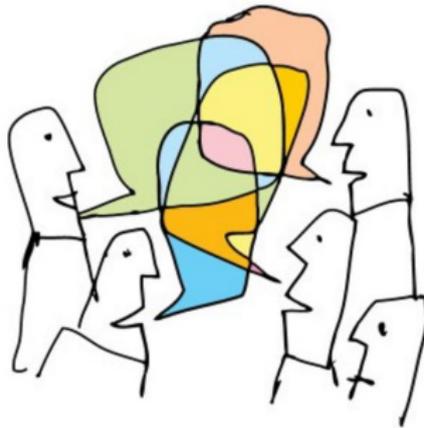


Example: Peer review

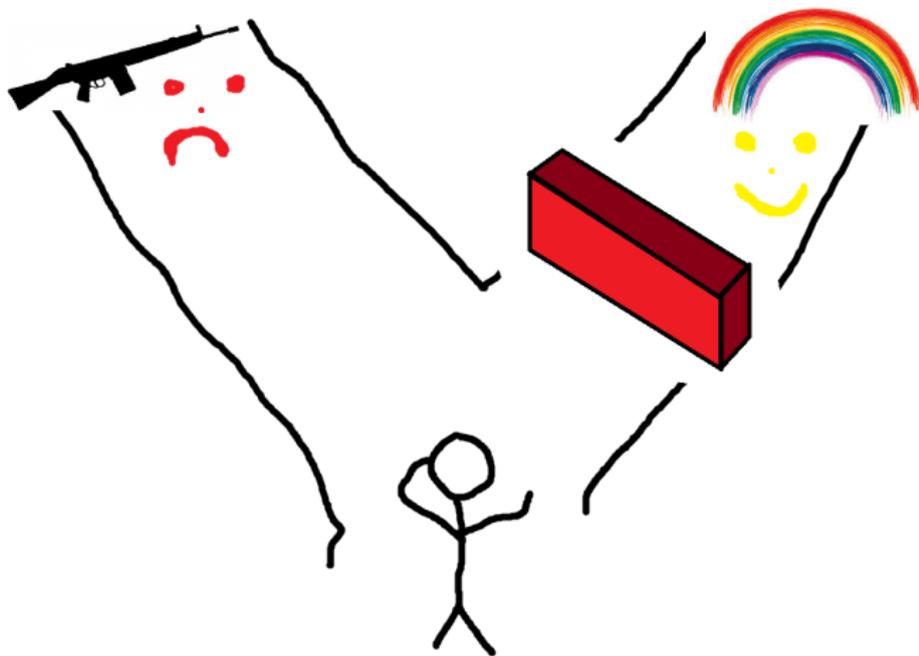


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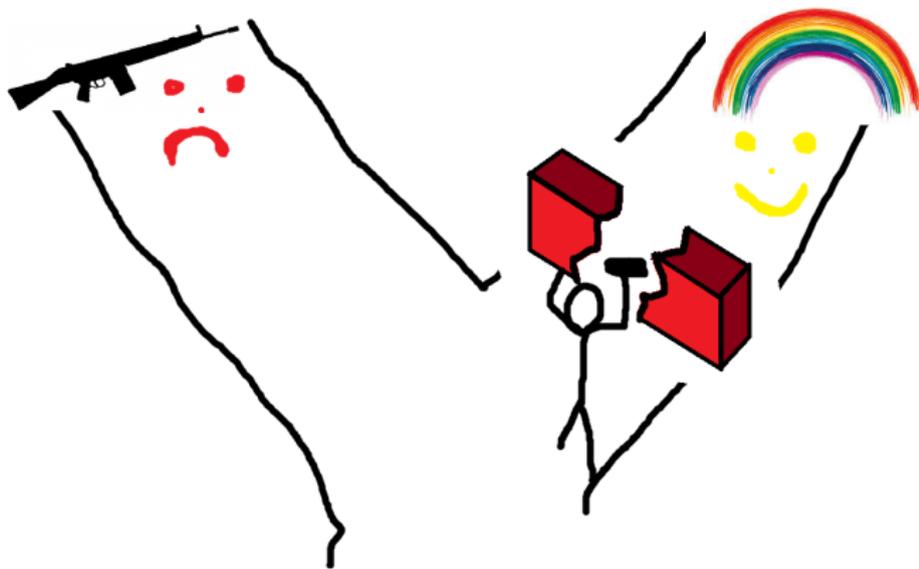
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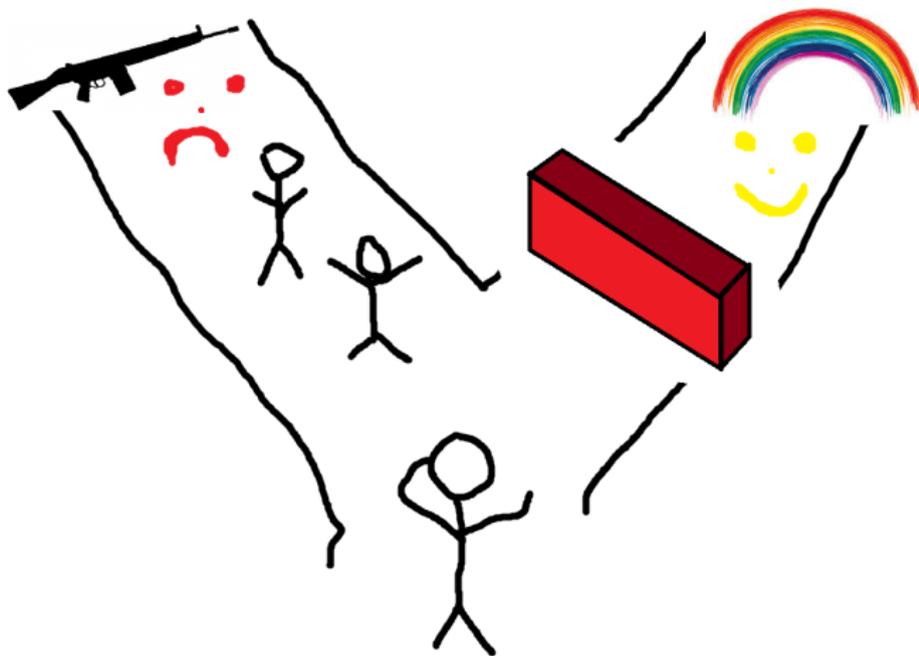
Libertarian paternalism



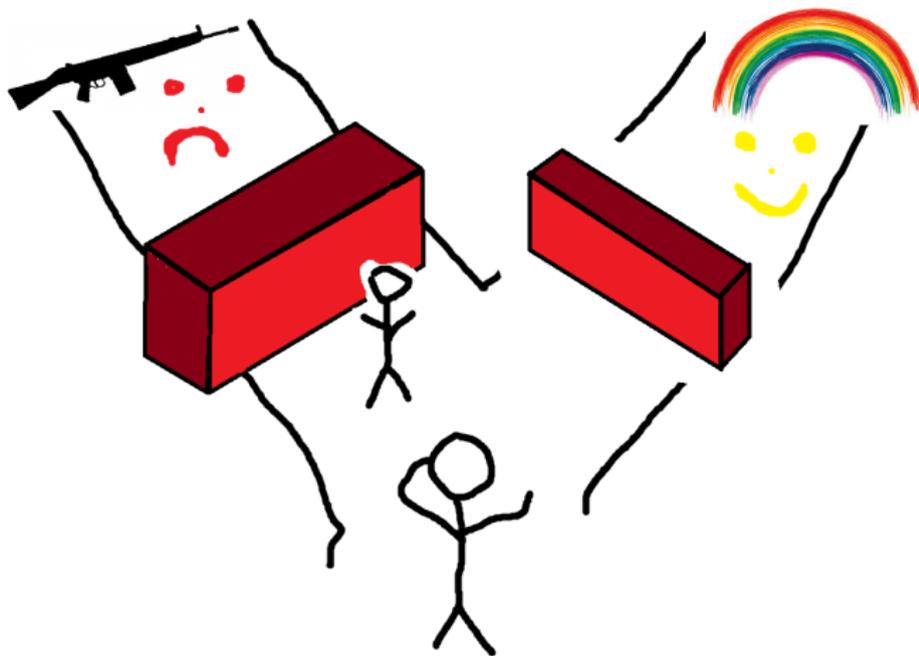
Libertarian paternalism



Libertarian paternalism



Libertarian paternalism



Lessons for the Global Brain

- Imposing structure (by technology), impossible to resist since omnipotent and omnipresent?
- Or constantly evolving structure that enables us to build the world we want?
- alienate our decisions from our acts?
- The choice is ours, constant opposition

Thanks for listening!