A Model of Runaway Evolution of Creative Domains

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(ADVERTISEMENT)

Musical Metacreation

@MetaMusical

http://metacreation.net/mume/

June 29th Concert of improvised duets between instrumental performers and software systems.
@ Cafe Oto, Dalston, London. 7pm.
http://www.cafeoto.co.uk/

June 30th Tutorial @ NIME2014 Workshops, Goldsmiths.
http://www.nime2014.org/

October 3rd-4th @AIIDE 2014 Workshops. Held at North Carolina State University, Raleigh, North Carolina.
(Workshop paper deadline *July 10th*).
http://www.metacreation.net/mume2014

Why

do we make art/music/poetry/etc.?

We don’t know…

but it matters for computational creativity.

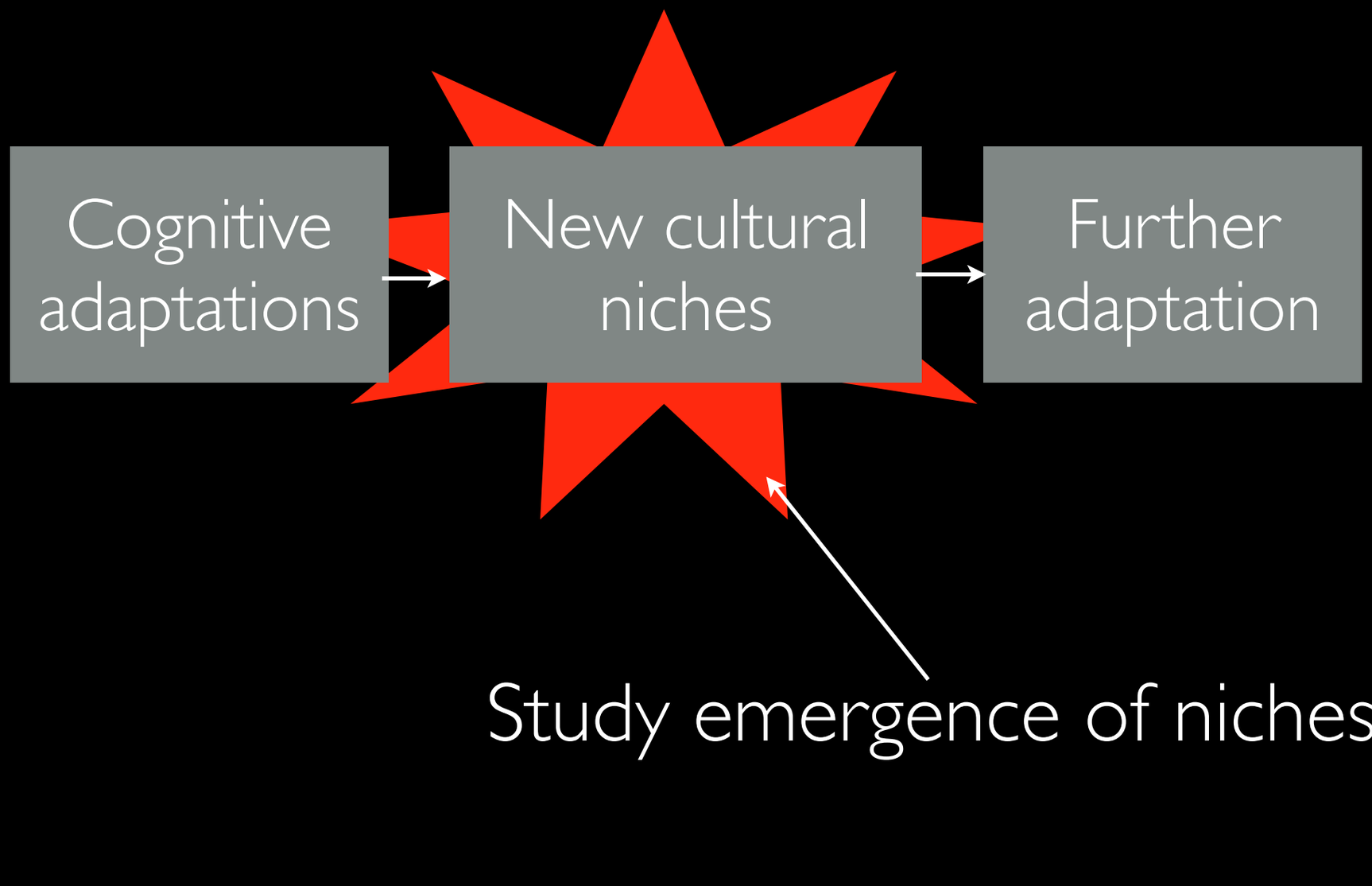
Example contributions to theory:

- Miller (2000): sexual selection hypothesis.
- Hargreaves and North (1997): social functions.

A Traditional View

A Niche Construction View

A Niche Construction View



We make art/music/poetry/etc. for no particular reason (except for some kind of emergent, autopoietic process that made it so).

Something in the population drives a fitness differential.

The fit ones enforce that thing, whatever it is.

Repeat. Reinforce.

The “Lottery Model”

- Broad characterisation of art/music:
  - Costly (e.g., time-consuming)
  - Non-functional (no apparent utility)
  - Undirected (no arrow of progress)
  - But can lead to success

The “Lottery Model”

Economic cycle:

- agents accumulate fixed pay (p)
- non-gamers are taxed (t)
- non-gamers get bonus (b)
- gamers pay fixed cost (c)
- one gamer is chosen at random and wins all of the c payments.

The “Lottery Model”

- So at each time step:
  - Non-gamer earns (p + b - t)
  - Average gamer earns (p)
  - If (b>t) then *on average* it is better *not* to play game.

The “Lottery Model”

- Evolutionary cycle:
    - Tournament selection
        - Wealth is inherited by paying a fixed proportion (20%) to offspring, but with a “wealth depreciation coefficient” (0, 0.9, 0.99, 0.999).

Note human-specific aspects of model - transferrable wealth and social norms - offers human-specific evolutionary processes.

The “Lottery Model”

Q: Under what circumstances does the population become dominated by game-playing behaviour?

Non-game player earns (p + b - t)
Average game player earns (p)

Variables

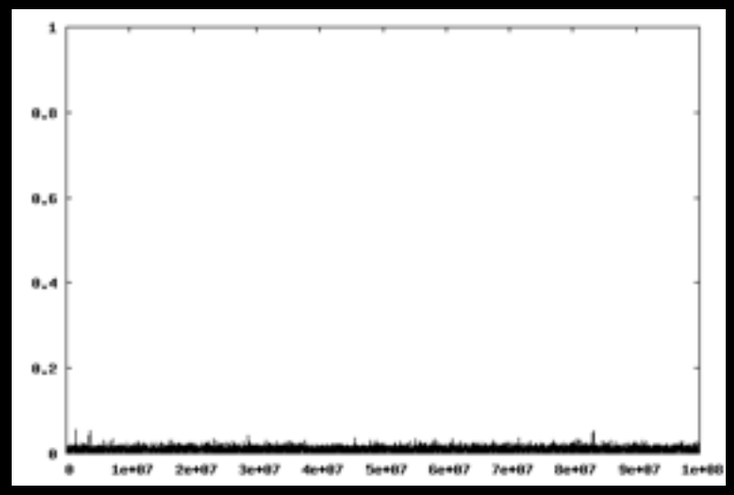
wealth depreciation (d) = 0.999

pay (p)=1
game-playing cost (c) =1
non-player bonus (b)=1

t = taxation

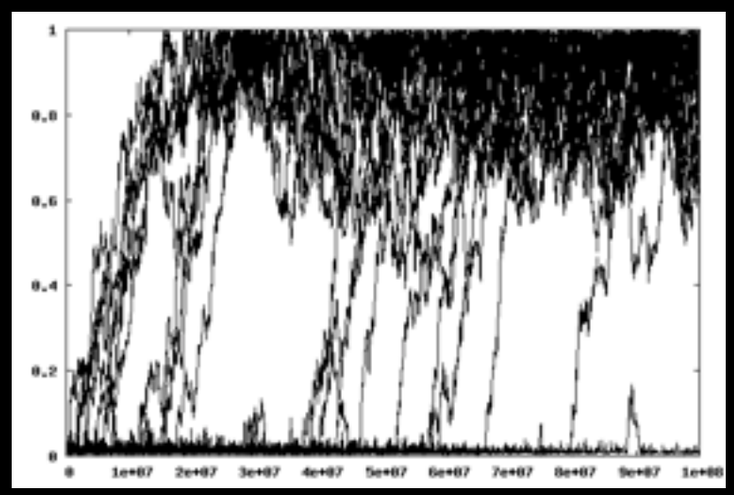
t=0

g=1
n=2



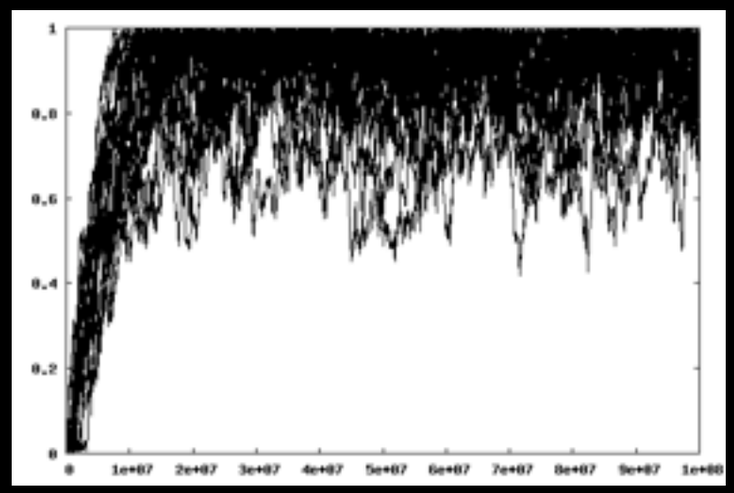
t=0.4

g=1
n=1.6



t=0.6

g=1
n=1.4



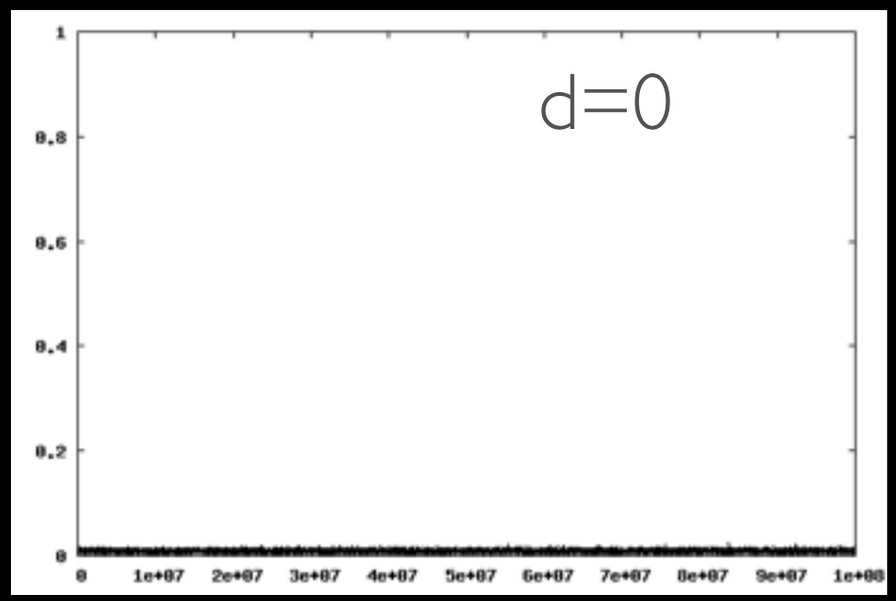
proportion of game-players in population
(multiple runs superimposed)

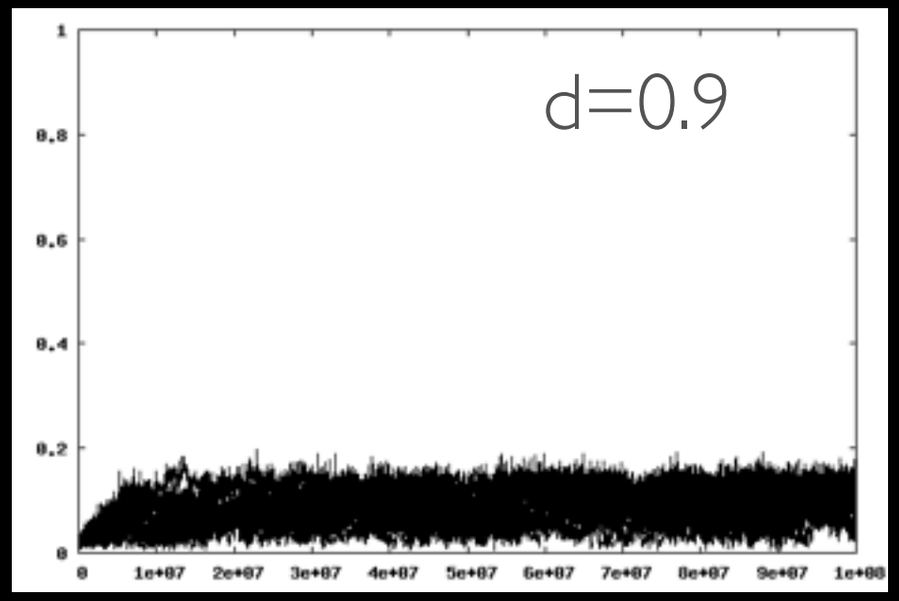
time

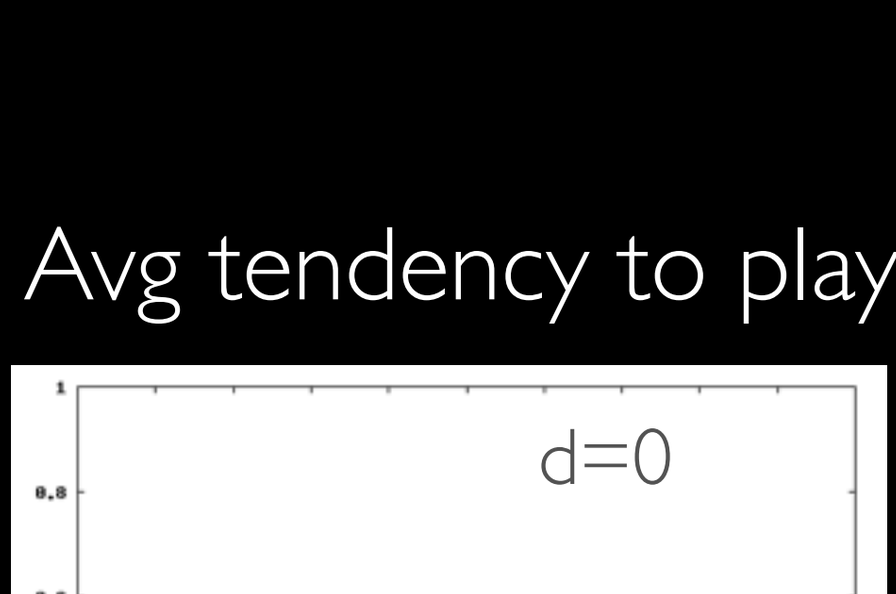
Variations and additional genetic variables:

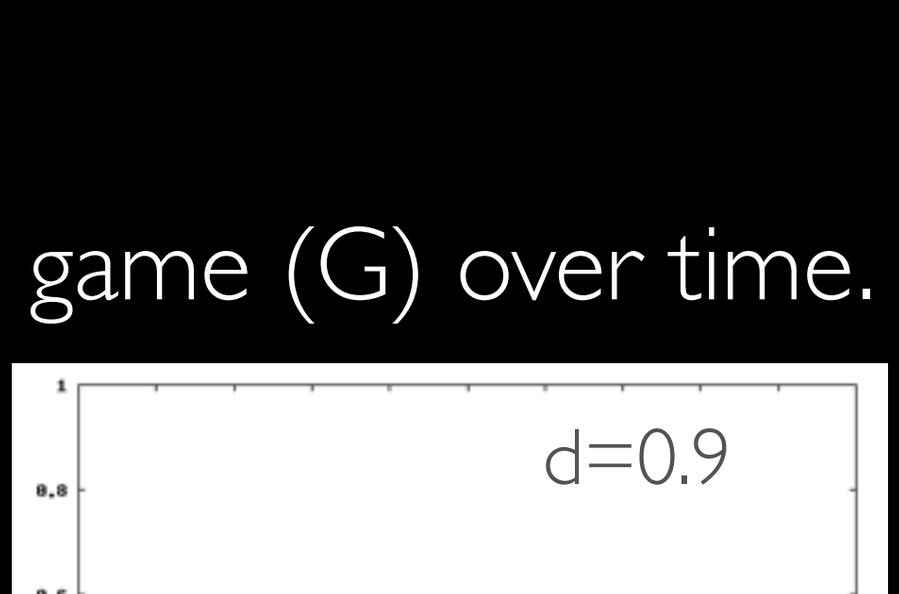
- Allow agents to vote on the non-game player taxation (t)
- Provide an “ability to cheat”

Avg tendency to play game (G) over time.



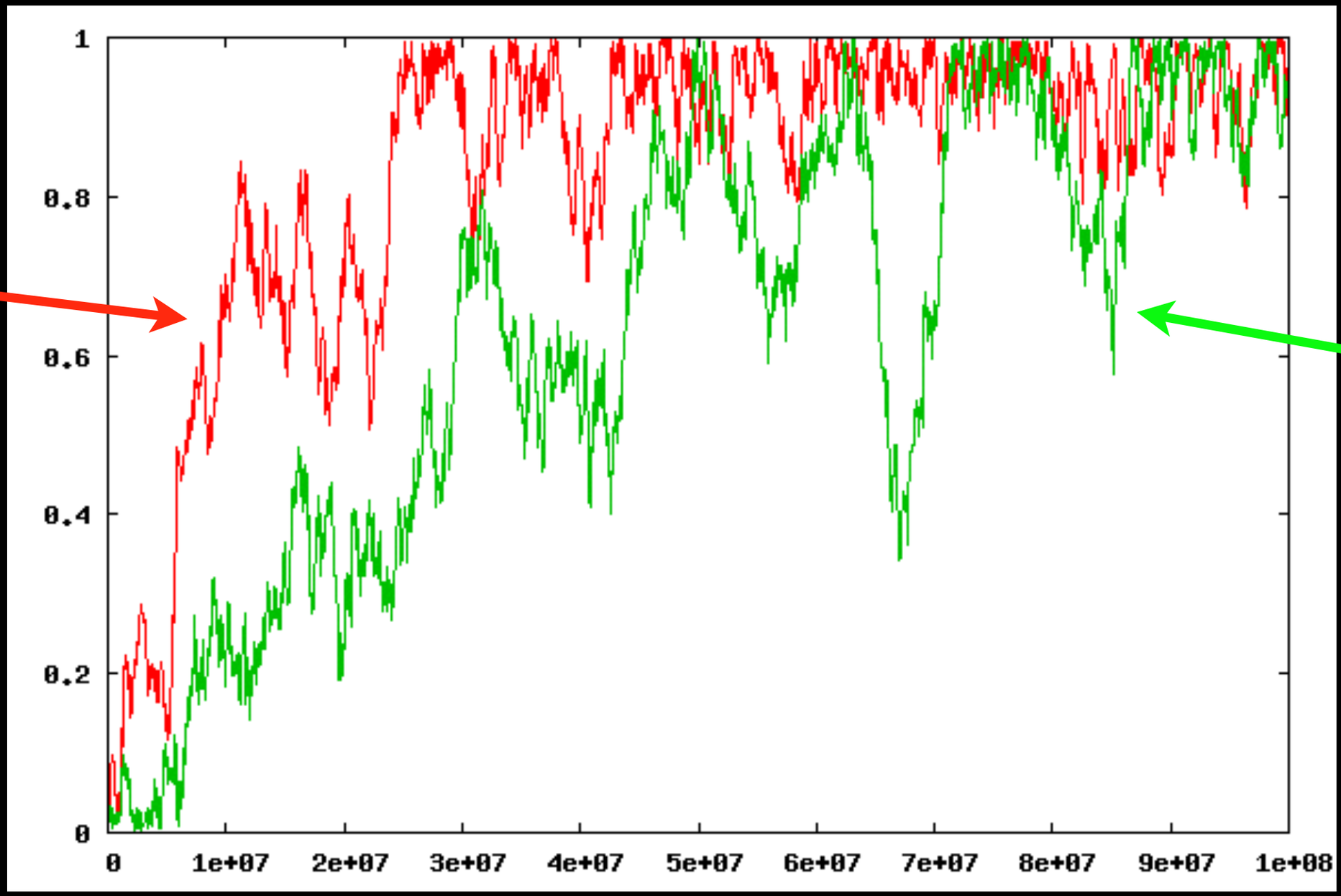






p=1, c=1, b=1, t=avg of T votes

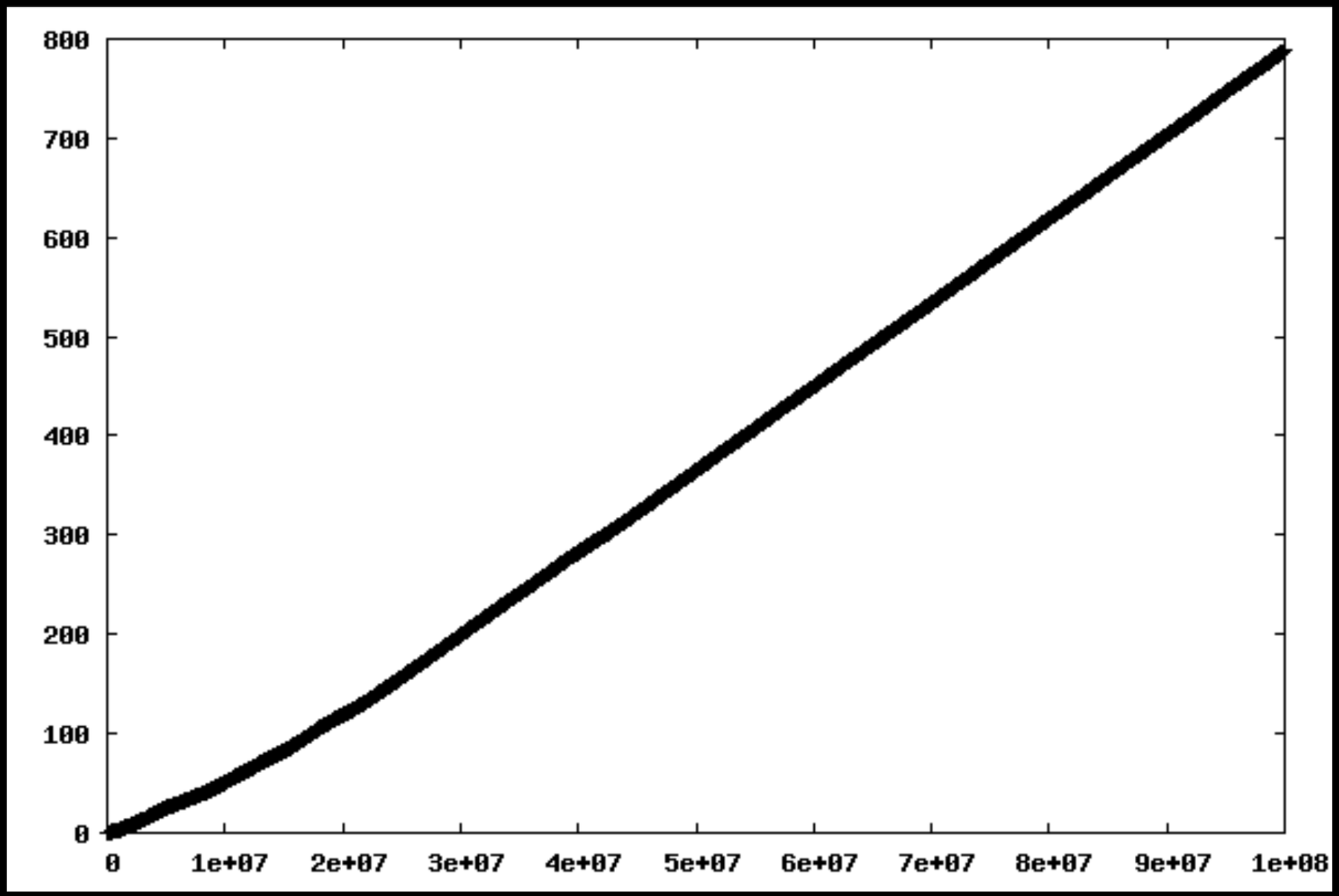
avg G



avg T

p=1, c=1, b=1, d=0.999, t=avg of T votes

Avg ability to cheat (C) over time.



p=1, c=1, b=1, d=0.999, t=avg of T votes

CAVEAT

This is a proof of concept.

But it does demonstrate a *mechanism*.

Interpretation of model:

Wealth	Quantity that is beneficial and transferrable (e.g., status)
Game playing	Devoting resources to a wealth-concentration activity
Taxation	Method of enforcement of the activity
Lottery (randomness)	The method of selection can be arbitrary...
Ability to cheat	... but it can also be non-arbitrary

On Randomness (Arbitrariness)

Wilson, D. 1994. Adaptive genetic variation and human evolutionary psychology. *Ethology and Sociobiology* 15:219–235.

Q: Think about gender. How is it assigned?
A: Random. 50/50 split. Assigned at birth.

Q: Why do we have gender?
A: Power of sexual recombination. Or just a freak transition.

Couldn’t other powerful social structuring principles be assigned by randomness? e.g., boldness versus shyness. Traits are randomly assigned, adaptive behaviour means finding the “role” that suits your traits.

Conclusion

Social simulation models can influence plausibility factors when considering evolutionary origins.

This models shows that a potential evolutionary scenario in which art is evolved-but-functionless has a viable evolutionary mechanism.

Such a scenario would/should impact how we think about computational creativity at the individual level.

More social simulation models please!

Thank you!

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