WHAT'S GOING ON HERE

This zine is part of a series of footnote zines to the project "Memetic Engines of Anticapitalism." Due to a whole lot of complications (mainly involving chronic illness) the version of this zine is at some stage of draft, not the polished and complete edition.

All of these zines will be available for free online and in perpetuity when they're finished, and updated regularly in the meantime.

If you want to follow up, the QR code on the front of this zine will take you straight to the most recent web page edition and an archive of each iteration that was separately published.

For more general updates and information on the whole project, this QR code will take you straight to memeticengines.com, where you can see the overview and any news about the works, sign up for the mailing list, or get in touch with me to ask clarifying questions.

ZINES IN THE SERIES:

- Replicate, Mutate, Select
- The Memetic Landscape
- This Is Propaganda
- Ethical Hypocrisy
- Little Ideas in Memetics
- Capital's Not Capitalism
- What Are Pacta
- Some other awful things that are inevitable under capitalism
- The Third Derivative of Value
- This Is George
- Self-Destruct, LLC.

AND COMING SOON,

- My Chronic Illness as a Case Study in the Shortcomings of Capitalism

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101 on the core of evolution as a theory

By T.X. Watson

version β1

Most people have a decent grasp of the mechanics of evolution: genes mutate, creatures' qualities change because of that mutation, and their children can inherit those qualities. The better the genes are for you, the more likely you are to pass them on.

And that's... almost right.

It covers the events that happen in biological evolution, but it doesn't really get at the systemic cause -- and it's that cause that you need to understand in order to get how evolutionary theory can be applied to other fields.

Quality Replication

Evolution happens to things that replicate a lot, and that replicate successfully. If some of the DNA in a genome got mixed up every time it got copied, no product of reproduction would reliably act like its parent.

DNA is an extremely good replicator. It has an extremely low error rate. Which brings us to the next thing you need to understand. (It's a weird word but I promise it's not that hard to understand.)

Stochastic processes

Stochastic just means random. Let's get that out of the way up front. The only reason that scientists use the word 'stochastic' instead of 'random' is because when people hear 'random,' they almost always think it means

Works Cited

Fossum, Solveig, Elliott Crooke, and Kirsten Skarstad, "Organization of sister origins and replisomes during multifork DNA replication in Escherichia coli," The EMBO Journal 26 no. 21 (2007): pp. 4514–4522. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2063475.

Milo, Ron and Rob Phillips, "What Is the Mutation Rate During Genome Replication?" Cell Biology By The Numbers. July 2015. http://book.bionumbers.org/what-is-the-mutation-rate-during-genome-replication/

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of thousands of years there was barely any growth in the complexity of the memetic world. It wasn't until we started using writing to store information that ideas could survive and reproduce with enough fidelity that the ideas at the limits of human comprehension could start iterating in ways that allowed them to grow beyond the scope of human minds.

'unpredictable.'

But the truth is, the outcomes of random processes are extremely predictable when they occur in abundance, even while it remains impossible to predict the outcome for every individual.

For example: if I went into a room with everyone who bought a lottery ticket today, I couldn't walk up to someone and say with confidence "this person won't win any substantial amount of money today."

But I could tell you, with near certainty, what percentage of people will win, and about how much they'll win, and about how those winnings will be distributed.

When the number of events is large enough, "extremely low odds" doesn't necessarily mean "this probably won't happen." It means "we can calculate the likelihood that it will happen and how frequently it may happen."

So when I say that DNA is an extremely good replicator, that doesn't mean it's surprising that evolution happens. Because DNA replication events happen constantly, billions of times a second.

To give you a sense of what that means, practically: you're probably aware that E. Coli is often used in studies about evolution because it's known to mutate and adapt very quickly. A single replication of an E. Coli cell takes about an hour; Studies involving E. Coli mutation usually begin and end within a few days.[1] E. Coli's rate of mutation,

1 Solveig Fossum, Elliott Crooke, and Kirsten Skarstad, "Organization of sister origins and replisomes during multifork DNA replication in Escherichia coli," The EMBO Journal 26 no. 21 (2007): pp. 4514–4522. https://www.ncbi.

per base pair, per replication, is about one ten-billionth. That adds up to about 1 mutation per 1000 generations, anywhere in the genome.[2]

Random mutation, nonrandom selection

A common belief is that creatures mutate in ways that are beneficial to them, in order to attempt to survive. That mutations are like rats fleeing a sinking ship, swimming toward dry land.

The truth is that if swimming represents mutation, then the rats go in every direction.

For most of them, it means nothing particularly comes of it: most mutations have no real consequence.

For some, things get worse: maybe they swim into a whirlpool, or a shark. The second most common kind of mutation after "does nothing" is "makes things worse" -- for example, this is what cancer is.

And very, very rarely, some of the rats will find land: by nothing other than random chance. Sometimes mutations help.

What's most important to understand is that mutations aren't successful because they make the organism better, in any intrinsic sense. The value of a mutation is determined by the organism in its relationship to its environment. That environment includes the inorganic landscape, whether that's rocks or water. But it also includes all the life that's also there.

For example, a bright stripe of color on a creature's back could be an advantage, if it makes them more attractive to mates -- but it would be a disadvantage if it also makes them super-visible to predators -- unless it also makes those predators think it's poisonous and avoid it. That means all that potential advantage and disadvantage happens in the reactions of creatures other than the one that mutated. In isolation, the bright stripe is nothing.

It also means that, as the environment changes, the value of traits change. Famously the Peppered Moth's population shifted from mostly light-colored to mostly dark in a short span of time when, during the Industrial Revolution, soot and smog darkened the bark of the trees they would land on. Where once darker moths stood out to predators, now lighter moths did.[3]

How this relates to memetics

Memetic evolution is a lot faster than biological evolution because the substrates for memes are all a lot easier to mutate than DNA.

The big one is human memory, and that's so prone to random mutation and transcription errors that for tens

nlm.nih.gov/pmc/articles/PMC2063475.

2 Ron Milo and Rob Phillips, "What Is the Mutation Rate During Genome Replication?" Cell Biology By The Numbers. July 2015. http://book.bionumbers.org/what-is-the-mutation-rate-during-genome-replication.

3 Wikipedia contributors, "Peppered moth evolution," Wikipedia, The Free Encyclopedia. Accessed March 6, 2018. https://en.wikipedia.org/w/index.php?title=Peppered_moth_evolution&oldid=827937046.