

Re: Robot Evolution

Source: <http://sci.tech-archive.net/Archive/sci.bio.evolution/2006-12/msg00322.html>

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 - *Date:* Wed, 27 Dec 2006 02:03:30 -0500 (EST)
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"Phil Roberts, Jr." philrob@xxxxxxxxxxxxxxxx:–

John Lucas's 'Godel' argument has been much-criticized – and Penrose's views in this area are essentially a variation on it.

I concede that there is a clear majority who disagree with the Lucas/Penrose position. On the other side of the equation, however, we have:

- a. Hofstadter, Dennett, Penrose, Clarke and Chaitin, in various ways acknowledging that Godel at least SUGGESTS a disconnect between formalism and mathematical reasoning.
- b. Little unanimity as to what exactly is wrong with the Godel argument, with dozens and dozens of different sorts of objections, many based on impenetrable confabulations.
- c. Papers still being published criticizing the Godel argument against mechanism almost 80 years after Godel first published his theorem.
- d. The universal abandonment of Hilbert's program of formalizing mathematical reasoning by mathematicians all over the world subsequent to Godel's proof.
- e. Intersubjectively reproducible empirical evidence (feelings of worthlessness) suggesting that not even Mother Nature herself seems to be able to constrain rationality within a formalism (the program for "trying to stay alive").
- f. Evidence (e.g., Parfit, 'Reasons

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and Persons', p. 12) that any theory that attempts to constrain rationality within a formal structure (e.g., a fixed objective) can be shown to sanction rational irrationality (i.e., can be shown to be self-defeating).

JE:–

Typically, Karl Popper who provided the missing Darwinian key just remains ignored:–

<http://philsci-archive.pitt.edu/archive/00002662/>

Incompleteness is based on the fact that all we can do about ANYTHING is make competing but entirely refutable guesses and _continuously_ evolve them. Each _rational_ guess must refute in favor of a better one providing a lineage of guesses which can explain more and more in an entirely testable way. It is the mystery of INDUCTION which sits at the heart of this matter. The truth about ANYTHING, including the truth about truth (it always remains incomplete because it is always based on just an inductive guess) including what language can express truth (which logic can support the latest testable against nature theory) do the following:

- 1) Perceive patterns.
- 2) Explain the perceived pattern using competing inductions (more than just the one guess).
- 3) Reformulate each induction into empirically testable theories which can be
 - i) Verified
 - ii) Non verified
 - iii) Refuted

by defining at least one different frame of reference for each contesting theory (each theory employed to explain the same or greater set of facts). If the proposed theory is just a tautology (circular logic) then it is proven not to be a theory of anything, e.g. mathematics. If just any two of the above three exist then only a model of a theory has been provided via the process of simplification/oversimplification of a valid theory. No model can validly contest or replace the theory from which it was simplified/oversimplified.

- 4) Test all theories on the table until just one is left.
- 5) When this stands refuted goto 1.

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Brief version of what's wrong:

``A mathematician often makes judgments about what mathematical statements are true. If he or she is not more powerful than a computer, then in principle one could write a (very complex) computer program that exactly duplicated his or her behavior.

Assumes what is being questioned.

JE:–

Mathematics and programming are not at all the same thing. Mathematics remains a tautology (based on axioms) but computer programs are not they remain based on human inductions. Put another way: mathematics remains based on just reversible set intersection while computer programming and what we call language also requires non eversible _set nesting_.

But any program that infers

Programs don't infer, they model logical relations that have been found to underly human inferences on most occasions. As to whether these relations are actually being followed or simply EMBEDDED IN our inferences remains to be seen.

JE:–

Put more simply: programs supply the most basic inductive inferences. A machine must be minimally supplied with the largest nested set. All it can ever do is mechanically deduce from this (and any others provided).

mathematical statements can infer no more than can be proved within an equivalent formal system of mathematical axioms and rules of inference,

True, but Lucas/Penrose assumes we can go beyond this, that the intuiting of mathematical truth is not simply a matter of logical proof:

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The immediate consequence is that truth cannot be defined in terms of provability.

JE:–

I contend that refutability and "provability" remain exactly the same thing. Something can only be refuted when a testable frame of reference becomes replaced by another, i.e. no refutation exists in a vacuum. Each refuted idea has to be replaced by another with a larger truth domain (the set of refutable but non refuted deductions which can flow from it must be larger). A theory can be considered proven when it provides a UNIQUE verification. This verification will also constitute a refutation of the old theory, e.g. Einstein's unique verification of c (the maximal velocity of light in a vacuum) necessarily refuted Newton's m and t (mass and time).

In any serious intellectual endeavor we shall be able to formulate simple mathematical arguments, and thus shall be subject to Godel's incompleteness theorem.

JE:–

Reasoning is NOT based on just mathematical tautologies, these were and remain based entirely on reasoning.

However far we go in formalizing our canons of proof, we shall be able to devise propositions which are not, according to those canons, provable, but are none the less, true. So it is one thing to be provable, and a different thing to be true. Truth outruns provability. (J.R. Lucas).

JE:–

Induction outruns deduction via a continuous evolution of inductions via the Popperian process of refutation.

This argument won't fly if the set of axioms to which the human mathematician is formally equivalent is too complex for the human to understand.

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What is the basis for the assumption that the intuiting of mathematical truth is based on a set of axioms, let alone that they must be too complex to understand?

JE:–

It has no basis. Mathematical axioms are just tautologies which have become expanded. All of these must be deducible from rational inductions which alone can form the basis of any empirically testable theories. IOW non empirical mathematics is entirely deducible from empirical NON mathematics.

These are amazing claims, which Penrose hardly bothers to defend. Reviewers knowledgeable about Godel's work, however, have simply pointed out that an axiom system can infer that if its axioms are self-consistent,

An axiom system can infer?

JE:–

Tautologies can only be expanded.

then its Godel sentence is true. An axiom system just can't determine its own self-consistency.

JE:–

Yes, because no tautology is rational, i.e. they remain logical but not rational.

But then neither can human mathematicians know whether the axioms they explicitly favor (much less the axioms they are formally equivalent to) are self-consistent. Cantor and Frege's proposed axioms of set theory turned out to be inconsistent, and this sort of thing will undoubtedly happen again."

JE:–

Yes: what is the set of all possible sets? Answer: any rational induction that can evolve via the process of refutation.

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Agreed. But we can nonetheless "know" them to be true in the sense that we all agree we have good reason to believe.

JE:–

No, belief is NOT required, just self consistency relative to at least one frame of reference which can be empirically tested to refutation.

As to what this has to do with evolution – if humans can do things no machine can do – or will ever be able to do – that may impact the hypothesis that machine–based organisms may replace humans as the dominant life form on earth over the next century or so.

JE:–

Machines cannot replace humans unless they can think for themselves (write their own programs _from scratch_)

More importantly, it would mean that there is reason to suspect that E. O. Wilson may have gotten it wrong in asserting genetic determinism:

Can the cultural evolution of higher ethical values gain a direction and momentum its own and completely replace genetic evolution? I think not. The genes hold culture on a leash. The leash is very long, but inevitably values will be constrained in accordance with their effects on the human gene pool (E. O. Wilson).

JE:–

Genes (epistatic dependent genetic combinations and NOT independent single genes) can only limit cultures. OTOH cultures can control (select) genes.

and that Dawkins may have actually gotten it right in asserting the converse:

We, alone on earth, can rebel against the tyranny of the selfish replicators" (Dawkins, 1976, p. 215).

JE+–

This is entirely a false gene centric notion (the misuse of an oversimplified theory). No "selfish replicators" exist in nature (not a single empirical additive gene fitness has ever been verified in

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nature no matter how you define fitness). Only degrees of fertile organism fitness mutualism empirically exist. These have been chronically mistaken for "selfishness" and "altruism" providing utterly irrational evolutionary theories (theories which cannot be tested to refutation. i.e. they remain "irrefutable" dictates).

However, this particular argument for the qualitative superiority of humans is simply wrong – and (IMO) rather obviously so for anyone who knows anything about Godel's work.

Why then is one of the papers you referenced written in 2004? Shouldn't this have all been over and done with decades ago for a flaw that is so "obvious"?

JE:–

If "this particular argument for the qualitative superiority of humans is simply wrong" then it could NEVER have been written in the first place.

snip<

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