

Re: Mathematics Is Not a Science

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in article d07joj\$9i\$1@darwin.ediacara.org, John Edser at edser@tpg.com.au wrote on 3/3/05 10:07 AM:

> *Guy Hoelzer* <hoelzer@unr.edu>

>>>>> *GH:*–

>>>>> *Hypothesis formation never refutes anything.*

>

>>>>> *JE:*–

>>>>> *This can easily be shown to be untrue*

>>>>> *using the hypothesis of shoe size.*

>>>>> *A hypothesis (like a theory) must have*

>>>>> *a thesis and an anti thesis where the*

>>>>> *anti thesis reverses cause and effect*

>>>>> *within the thesis and constitutes*

>>>>> *a refutation of that thesis. The*

>>>>> *proposition to be tested is the foot*

>>>>> *causes the shoe size (the shoe size does*

>>>>> *not cause the foot). Thus the antithesis*

>>>>> *of the hypothesis that I take a size 7 shoe*

>>>>> *is any other size shoe that actually fits.*

>>>>> *The reason is simple: two different*

>>>>> *sizes cannot fit the same sized*

>>>>> *foot unless the foot has to fit the*

>>>>> *shoe (the anti thesis). When you reverse*

>>>>> *cause an effect you simply chop the foot to*

>>>>> *make the shoe fit. Mathematics does not*

>>>>> *care one way or the other.*

>

>>>>> *GH:*–

>>>>> *The act of forming the hypothesis does not constitute a refutation of*

>>>>> *anything.*

>

>>>>> *JE:*–

>>>>> *How am I supposed to respond to the above?*

>>>>> *All you have done is repeat the*

>>>>> *assertion which is under dispute.*

>

>> *GH:0*–

>> *That is correct. AFAIKS there is nothing in your response that impinges on
>> the validity of my statement. If my statement were false (even a little bit)
>> then we could do science merely by hypothesis formation.*

>

> *JE:–*

> *But I did NOT just _form_ a hypothesis.
> I provided a theory and a hypothesis attached
> to that theory and the tests that are required.
> Your statement only refers to the act of hypothesis
> formation so it had no valid context to this
> discussion unless it inferred that was all I was
> doing. Therefore I took it to mean this. However
> such an inference is invalid. You must prove that
> the theory and the hypothesis attached to it that
> I provided were invalid before you can infer (via
> any back door) that this was all I was doing.*

>

>

>> *snip<*

>

>>>> *GH:– I perceive science in general as a coherent process. Scientific
>>>> disciplines come and go as science proceeds. The scientific disciplines we
>>>> recognize at any point in time ought to each involve both theory and
>>>> empiricism. Interestingly, population genetics had a very weak empirical
>>>> component until the late 1960's, when the advent of electrophoresis began to
>>>> yield plenty of relevant data. More than three decades of empirically
>>>> unconstrained modeling probably contributed to the problems of scientific
>>>> imbalance that you call abuse, much of which persisted as a matter of
>>>> scientific culture within population genetics for more decades (even to
>>>> this day, IMHO).*

>

>>> *JE:–*

>>> *Do you agree or disagree that it is not acceptable
>>> for population genetics to be based on non epistatic
>>> gene fitnesses via Fisher's dictate when not one single
>>> non epistatic gene fitness has ever been documented
>>> within nature?*

>

>> *GH:– It is acceptable to make simplifying assumptions like this when
>> modeling, and there are very many examples where these models make accurate
>> predictions despite their simplifying assumptions. Population genetic models
>> (single locus models) have also had great heuristic value, IMHO.*

>

> *JE:–*

> *If "not one single non epistatic gene fitness
> has ever been documented within nature" yet
> Fisher required them if they are to be "heritable"
> do you agree that Hamilton's model must also
> require them for his model to be valid?*

You misunderstand Fisher. The influences over the expression of any trait, including fitness, which is the ONLY trait that selection can act on directly, can be statistically (this is Fisher we are talking about after all) decomposed into additive and non-additive components. His conclusions, and Hamilton's model, do not depend on the existence of individual genes with perfectly additive effects on fitness.

>> GH:–

>> *On*

>> *the other hand, the success of these models does not rely on, or even*

>> *predict, that the fitness effects of alleles at a locus are additive.*

>

> JE:–

> *Fisher required additive (non epistatic)*

> *gene fitnesses. Hamilton also required them*

> *if his gene is not to be restricted to being*

> *selected at just the one, same level of selection.*

This is not correct (see above).

> *If Hamilton's gene produces organism*

> *fitness altruism via selfish geneism*

> *at just the one dependent level of selection and*

> *not at any different independent level then*

> *any gene that does so reduces that gene's*

> *fitness via such an _irrational_ act.*

If I understand you correctly, I disagree. As you know, I have given arguments supporting the multilevel selection framework. I haven't convinced you of the fallacy of the primacy of the individual organism position, and you haven't convinced me that it is reasonable either.

>>>>>> JE:–

>>>>>> *Science has formalised this process and*

>>>>>> *usefully employed mathematics within it.*

>

>>>>>> GH:– *Indeed. So it seems that you agree math has taken on a key role in*

>>>>>> *science, but you are arguing that other sorts of tools might be equally*

>>>>>> *effective.*

>

>>>>> JE:–

>>>>> *No, I am arguing that mathematics is not a science.*

>>>>> *This does not exclude science employing mathematics*

>>>>> *but it does exclude mathematical models as science*

>>>>> *in their own right.*

>

>>>> GH:– *I agree to a degree, but it is strange to talk about modeling without*

>>>> *regard to what is being modeled.*

>

>>>> JE:–

>>>> *It is much more than "strange" to talk*

>>> *about modelling without regard*
>>> *to exactly what is being modelled IMHO.*
>
>> *GH:–*
>> *snip<*
>> *...my comment was in response to your writing about "modeling without regard*
>> *to what is being modeled;"..*
>
> *JE:–*
> *Do you agree or disagree that nobody here,*
> *including yourself has never defined what these*
> *models are simplified from until now?*

I haven't kept track, but you might be correct. I think this is because my answer, if correct, may have been so obvious that it didn't seem possible it was the sort of thing you were fishing for. I will be curious to see if others comment one way or the other on the answer I gave, but this thread may have become so tedious that you and I may be the only ones paying attention.

>>> *JE:–*
>>> *I have been requesting (for over 4 years) for*
>>> *any professional Neo Darwinist that posts here*
>>> *to provide what these models, e.g. Hamilton's*
>>> *Rule, are simplified/oversimplified from. Nobody*
>>> *will oblige. Do you agree that it is an act of*
>>> *contempt for anybody to argue that a model*
>>> *is a simplification/oversimplification but*
>>> *fail to provide from what it was simplified/*
>>> *oversimplified?*
>
>> *GH:–*
>> *I do not agree that it is "an act of contempt" because your question*
>> *presupposes something irrelevant to most of us (if I might be so bold as to*
>> *speak for the others). Everybody realizes that it is simplified from the*
>> *complexity of nature, but it was not derived as a model of an articulated*
>> *theory that contested Darwinism.*
>
>
> *JE:–*
> *This represents the first response to this*
> *question in over 4 years! I thank you for*
> *your response. However, can't you see that*
> *"the complexity of nature" is just*
> *a dictate of something you believe in unless you*
> *can provide a theory of what you are talking about?*
> *I mean, for all I know you may be talking about*
> *elves and hobgoblins as part of "the complexity*
> *of nature".*

Yup. I have no problem with saying that we recognize nature is very complex without specifying the details of all that complexity. I am certain that neither Hamilton, nor his followers, would have imagined elves and hobgoblins in that black box, but they also allowed that it contains many things of which they were not aware. That still permits one to recognize that the kin selection model is a simplification of nature without being able to articulate the details of one's overarching theory of nature. Theories are certainly simplifications of nature in the same sense that models are simplifications of theories, so from what theory of nature would you say that Darwin's model of natural selection was derived? Science just does not operate as Popper envisioned.

- > *Darwin provided a refutable theory of nature.*
- > *I have outlined an empirical experiment to test*
- > *his theory of evolution by natural selection to*
- > *refutation. You have always refused to comment*
- > *on it except in passing. If I recall correctly your*
- > *comments were "interesting" and something like*
- > *"there may be some sort of difficulties".*
- > *You never ever elaborated. Unless anybody here or*
- > *elsewhere can come up with an alternative refutable theory*
- > *of evolution then we are stuck with Darwin's as*
- > *the only empirically valid theory that we have.*

I have also posted that IMHO Darwin's theory is NOT refutable. I did indeed find your experimental design interesting, but I never embraced it because I don't think it would be as telling as you do. I do not agree that it could be used to refute Darwin's theory.

- > *This being the case, Hamilton's non refutable model*
- > *must have been simplified/oversimplified from Darwin's*
- > *theory of nature unless elves an goblins*
- > *are allowed as valid complexities of nature. I mean,*
- > *it is most certainly true that Darwinism cannot*
- > *explain any of _them_.*

As I said, I do not see kin selection as a simplification of Darwin's theory; rather as an extension of it.

- >> *GH:–*
- >> *It was derived from Darwinism itself, I suppose, in the sense that it*
- >> *extended the theory of natural selection beyond its historical bounds.*
- >> *Therefore, there was no pre–existing complex theory that was simplified in*
- >> *the creation of the kin selection idea.*
- >
- > *JE:–*
- > *Your comment "It was derived from Darwinism itself" belies*
- > *belief. Are you suggesting that Darwin never supplied a*
- > *valid theory of evolution by natural selection?*

No. I can't imagine what made you ask this.

>> *GH:*–

>> *Your question just does not fit into the way science always works, or worked
>> in this case.*

>>

> *JE:*–

> *Quite obviously, I disagree. My view is
> that you are attempting to evade the only
> possible way Hamilton can be said to be
> joined to Darwin as an oversimplification
> of Darwin. If Hamilton is not joined to
> Darwin then Hamilton is just an irrelevant
> heuristic.*

An extension is not the same as a subset. I am arguing that Hamilton EXTENDED Darwin's theory by laying the conceptual groundwork for multilevel selection theory, which is the term I prefer to use for the extended theory.

>>>> *GH:*–

>>>> *Once you include context as part of the modeling
>>>> exercise it is tied to empiricism and natural phenomena. Then is
>>>> becomes a scientific exercise IMHO.*

>

>>> *JE:*–

>>> *Do you agree that it is invalid for any
>>> simplified/oversimplified model to contest
>>> the theory from which it was simplified/
>>> oversimplified?*

>

>> *GH:*–

>> *If a model was designed to represent a particular theory in simplified form,
>> then I would agree with you. This is just not what most modeling is about.*

>

> *JE:*_

> *What else can modelling be about? Science is about making
> _empirical_ sense of the world via testable theories of
> nature. Models can only help or hinder this process.*

Models can have either or both heuristic value and predictive value. You apparently recognize only heuristic value as part of science. Ignoring the predictive value of models, they need not be true to have heuristic value. Lamarck's paradigm for adaptive evolution is a great example. Science is a process of learning, which is often accomplished by reaction to past (heuristically valuable) errors. Models have proven very useful in this regard.

> *Obvious simplifications that mathematical models make
> such as random mating, infinite populations or the
> deletion of all epistasis including gene fitness
> epistasis are only made to help concentrate logic on*

- > a PART of a theory. No refutable theory of nature
- > that I know can or could assume these things.
- > If they did such a proposed theory of nature would be
- > thrown out as laughable. I put to you and sbe reader's
- > that the only valid use a model has is to help and
- > not hinder a fuller and easier understanding of a
- > testable theory of nature. If you divorce the model
- > form its parent theory and employ it as a stand alone
- > mechanism to interpret nature, then such an event is
- > absurd.

I disagree. It would only seem so if you completely swallow Popper's cartoonish view of science to the exclusion of other approaches.

>>>>> GH:– Can you suggest alternatives that might relieve science from its
>>>>> current reliance on math? Can you suggest an alternative that you think
>>>>> is better than math? Do you think that science might be better off
>>>>> without math?

>

>>>>> JE:–

>>>>> Science can be done without any mathematics but I agree that it can be
>>>>> done better employing mathematics but I strongly suggest that science will
>>>>> be worse off when mathematics is misused. My example is Hamilton's Rule.

>

>>>>> GH:–

>>>>> How is that different from saying that science is worse off when
>>>>> empiricism is done badly?

>

>>>>> JE:–

>>>>> These models remain irrefutable so
>>>>> that Empiricism within the sciences has
>>>>> "not been done badly" it has become emasculated.
>>>>> All that can be empirically done with
>>>>> models per se is verification or non verification.
>>>>> Hamilton's Rule which is just a 100% relative
>>>>> proposition cannot even measure what it claims
>>>>> to be able to measure i.e. cannot provide
>>>>> a verification let alone a refutation.

>

>>>>> GH:–

>>>>> Hamilton's Rule does not claim to be able to measure anything, so your
>>>>> comments here just don't make any sense.

>

>>>>> JE:–

>>>>> Yes, it cannot measure ANYTHING
>>>>> Do you agree that the rule was misused to
>>>>> measure when organism fitness altruism can
>>>>> evolve within nature after group selection failed
>>>>> to be able to do so over 50 years ago?

Group selection is far from refuted, and the phrase "measured when" makes no sense to me here. The only possible meaning I can attribute to that phrase would be a measure of amount of time, but that doesn't appear to fit in your sentence. I do not think that Hamilton's Rule was ever used by anybody to directly measure anything.

>> *GH:*–

>> *I agree with you, however, that models are not very useful for refutation.*
>> *Surprisingly, a model is a kind of hypothesis, yet you argued above that*
>> *hypothesis formation (e.g., model building) CAN itself result in refutation.*
>> *You seem to have contradicted yourself.*

>

> *JE:*–

> *You misunderstood me. I argued that a hypothesis*
> *represents a refutable part of theory where a*
> *refutation of the hypothesis does _not_ refute*
> *the theory, just that part of it. Testing my*
> *shoe size does not refute that I exist. e.g*
> *I refuted that my shoe size was a size 11*
> *only because size 7 actually fits.*

>

> *Any hypothesis and therefore any model*
> *(if it is to be regarded as a hypothesis)*
> *must be attached to a refutable theory.*
> *It is pointless arguing that the elves*
> *at the bottom of my garden take*
> *a size 6 shoe if no elves exist. In*
> *the same way a model must be attached*
> *to its parent theory and provide empirical*
> *results in its own right.*

OK, here is one of the weaknesses in Popper's paradigm. Just because your foot fits size 7 and not size 11 cannot refute your theory because it is an examination of only one instance. The theory is not refuted until it has been shown that there cannot ever be an instance in which the prediction would hold. This is not something that can ever be accomplished empirically.

[big snip of thread where we don't seem to be getting anywhere]

Guy