Re: Panu Raatikainen's review of two of Chaitin's books.

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From: Stephen Harris (*cyberguard1048−usenet_at_yahoo.com*)
Date: 05/14/04

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Date: Fri, 14 May 2004 04:39:10 GMT
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"Eray Ozkural exa" <erayo@bilkent.edu.tr> wrote in message
news:fa69ae35.0405130556.28994da@posting.google.com...
> Torkel Franzen <torkel@sm.luth.se> wrote in message
news:<vcbsme5pup8.fsf@beta19.sm.ltu.se>...

> > and a set of axioms of very modest complexity that proves
> > Dirichlet's theorem. What is the correlation you have in mind?
>
> The correlation I have on my mind is digital. > Eray Ozkural

SH: I wasn't able to connect mathematical randomness to either
quantum randomness or to have application to a physical universe.
The 'self−refererncing' mentioned bewlow reminds me of Langan's
proof of god effort. Wolfram has an idea of the universe evolving
from a cellular automata, which only takes 7 or 8 billion years to test.
Wolfram mentions Chiatin and randomness. That book is online.
Here are some of my investigatory efforts:

"The Abstract State Machine (ASM) Project (formerly known as the
Evolving Algebras Project)
has the thesis that any algorithm can be modeled at its natural
abstraction level by an appropriate ASM. Given a specification, how
does one know that the specification accurately describes the
corresponding real system? Since there is no method in principle to
translate from the concrete world into an abstract specification, one
needs to be able to see the correspondence between specification and
reality directly, by inspection."

J . Schmidhuber. Algorithmic theories of everything. Technical Report
IDSIA−20−00, Version 2.0 (Dec 20, 2000), quant−ph/0011122

"Abstract. The probability distribution P from which the history of our
universe is sampled represents a theory of everything or TOE. We assume
P is formally describable. Since most (uncountably many) distributions
are not, this imposes a strong inductive bias. We show that P(x) is

small for any universe x lacking a short description, and study the spectrum of TOEs spanned by two Ps: P1 reflects the most compact constructive descriptions, P2 the fastest way of computing all computable objects. P1 requires generalizations of traditional computability, Solomonoff's algorithmic probability, and Kolmogorov complexity; it leads to describable objects more random than Chaitin's "number of wisdom" Omega. P2 derives from Levin's universal search in program space and a natural resource−oriented postulate: the cumulative prior probability of all x incomputable within time t by this optimal algorithm should be 1/t. Between P1 and P2 we find a universal cumulatively enumerable measure that dominates traditional enumerable measures; any such CEM must assign low probability to any universe lacking a short enumerating program. We derive P−specific consequences for observers evolving in computable universes, inductive reasoning, quantum physics, philosophy, and the expected duration of our universe."

"Since there is no method in principle to translate from the concrete world into an abstract specification..." does this contradict the assumption that "P is formally describable"? Not if we *assume* it.

Quantum mechanics is a probabilistic theory; entropy is identified with randomnes but the ideas presented below consider randomness to uniquely express the nature of reality.

"But Cahill and Klinger believe that this hints at a much deeper randomness. "Far from being merely associated with quantum measurements, this randomness is at the very heart of reality," says Cahill. If they are right, they have created the most fundamental of all physical theories, and its implications are staggering. "Randomness generates everything," says Cahill. "It even creates the sensation of the 'present', which is so conspicuously absent from today's physics."

To prove his theorem, Gödel had concocted a statement that asserted that it was not itself provable. So Gödel's and Chaitin's results apply to any formal system that is powerful enough to make statements about itself.

"This is where physics comes in," says Cahill. "The Universe is rich enough to be self−referencing−−for instance, I'm aware of myself." This suggests that most of the everyday truths of physical reality, like most mathematical truths, have no explanation. According to Cahill and Klinger, that must be because reality is based on randomness. They believe randomness is more fundamental than physical objects.
http://www.newscientist.com/features/features.jsp?id=ns22273

We discuss some physical consequences of what might be called ``the ultimate ensemble theory", where not only worlds corresponding to say different sets of initial data or different physical constants are considered equally real, but also worlds ruled by altogether different equations. The only postulate in this theory is that all structures

that exist mathematically exist also physically, by which we mean that
in those complex enough to contain self−aware substructures (SASs),
these SASs will subjectively perceive themselves as existing in a
physically ``real" world. We find that it is far from clear that this
simple theory, which has no free parameters whatsoever, is
observationally ruled out. The predictions of the theory take the form
of probability distributions for the outcome of experiments, which
makes it testable. In addition, it may be possible to rule it out by
comparing its a priori predictions for the observable attributes of
nature (the particle masses, the dimensionality of spacetime, etc) with
what is observed.
Max Tegmark Abstract: http://www.hep.upenn.edu/~max/toe.html

So could an SAS be the Universe, referencing itself. Are these ideas
reconcilable? How reliable is "inspection" as a technique? Is this
inspection of the same type that mathematicians use to recognize
truths that are not provable within the system?

I don't think these ideas resovle to mathematical formulae, but are
quintessentially philosophical. How to define your theory into reality:

"The only postulate in this theory is that all structures that exist
mathematically
exist also physically, by which we mean that in those complex enough to
contain self−aware substructures (SASs), these SASs will subjectively
perceive themselves as existing in a physically ``real" world."

SH: Who would want to question such a self−evident postulate?

2. Realism with respect to universals.
A universal is an entity, such as the property of being circular, that can
have a spatiotemporally scattered existence. Realism is the view that there
really are universals independently of language. Immanent realism adds the
claim that universals exist only in the ordinary spatiotemporal world;
Platonism is a transcendent realism. [however, another author writes]

"Anyway, the general idea is that at the foundation of our conceptions of
the physical world and of mathematics are certain "abstract elements" which
appear to be primitive concepts. So far G "odel is in very rough agreement
with Kant. What he mysteriously calls "another kind of relationship between
ourselves and reality" (than the causal, manifested in the action of bodies
on our sense organs) either consists of, or would account for, the fact that
these elements represent reality objectively. They are not "purely
subjective,
as Kant asserted." G "odel does not offer an interpretation of Kant's
transcendental idealism, but it is pretty clear he means to reject it. But
in talking of primitive concepts that are not subjective in Kant's sense,
whatever that is, G "odel may be following the inspiration of Leibniz.

http://philarete.home.mindspring.com/philosophy/universals.html
"An Argument Against Immanent Universals"

Ideally pragmatic,
Stephen