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

Source: http://coding.derkeiler.com/Archive/General/comp.theory/2004−05/0510.html

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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 09:43:40 GMT
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"Eray Ozkural exa" <erayo@bilkent.edu.tr> wrote in message
news:fa69ae35.0405120628.34fa0ef3@posting.google.com...
> *Hello there,*
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> *I have come across this strange review by a certain philosopher, and*
> *mere philosopher I must add, of Chaitin's work:*
> *http://www.ams.org/notices/200109/rev−panu.pdf*
>
> *Secondly, and most imporartantly, has Chaitin himself answered these*
> *"criticisms"?*
>
> *Comments most welcome,*
>
> −−
> *Eray Ozkural*

Did you also mean the criticism that Chaitin has made grandiose
philosophical claims? Algorithmic Information Theory = AIT Gregory Chaitin
wrote: http://www.cs.auckland.ac.nz/CDMTCS/chaitin/ait13.html
"AIT will lead to the major breakthrough of 21st century mathematics,
which will be information−theoretic and complexity based characterizations
and analyses of what is life, what is mind, what is intelligence, what is
consciousness, of why life has to appear spontaneously and then to evolve."

http://www.wolframscience.com/nksonline/page−1067a−text

"As a reduced analog of algorithmic information theory one can for example
ask what the simplest cellular automaton rule is that will generate a given
sequence if started from a single black cell. Page 1186 gives some results,
and suggests that sequences which require more complicated cellular
automaton rules do tend to look to us more complicated and more random.

SH: I think it is hard to distinguish between very complex patterns and
randomness. For instance, very diffiucult IQ test questions, which are
say 4 option multiple choice answers will have a distinct preference in

answer provided by people who tend to score highly on IQ tests. But
100 "average" IQ people will tend to answer these tough questions
with 25 or around 25% in each opiton: a−−>24 b−−>25 c−−>25 d−−>25
because they don't discern a distinctive pattern or closest fitting analogy
which is apparent to an examination of greater logical depth or intuition.

I don't think there will be any logical proof for creation by god or a
matter of chance; no way for us to discern whether some purposeful
pattern is behind how events unfold in the universe or whether this
favorable habitat for humans just arose from many possibilites as a
matter of chance. Which is why I occasionally mention this limitation:

John Case's Colt Page:
"Consider the problem of finding a rule for generating a sequence
of numbers such as 9, 61, 52, 63, 94, 46, 18, 1, 121, 441, ...
Here is a rule for this sequence. First compute the squares of
successive integers beginning with 3, but, then, to generate the
sequence, use, in place of these squares, the squares each with
its decimal digits written down in reverse order (ignoring any
lead zeros). N.B. This rule can be written as a formal algorithm
(or computer program). The problem of finding such rules gets
harder as the sequences to generate get more complicated than
the one above. Can the rule finding itself be done by some
computer program? Interestingly, it is mathematically proven
that there can be no computer program which can eventually find
(synonym: learn) these (algorithmic) rules for all sequences
which have such rules!"

SH: This describes the difficulty of finding/discovering a logical pattern.
A proof depends upon correctly finding and ordering a logical pattern.

"One rule that Wolfram demonstrated produces, quite reliably, a pyramid
shape. But once you get up around Rule 30, fascinating forms result −
highly irregular and utterly random to the naive eye. Other rules create
odd structures that proliferate awhile then die out, say after 3,000 steps
or so. Fascinatingly, some of Wolfram's models are dead ringers for such
natural forms as the variation seen in mollusk shell pigmentation patterns,
and the forms taken by snowflakes and tree leaves. What so tantalizes
Wolfram is that his models, which require such simple rules to generate,
can result in such rich complexity; the math seems a good metaphor for
rules embedded in nature. Or, in his words, "We've put so little in, but
we've gotten so much out. It seems to violate our prejudices − that
incredibly simple rules can produce incredibly complex phenomena."

SH: Do simple CA rules match up or correlate with simple axiomatic systems?

Torkel questioned:
"Specifically, we know that we can construct a set of axioms of
enormous complexity that proves only a set of truths of the form
s+t=u, and a set of axioms of very modest complexity that proves
Dirichlet's theorem. What is the correlation you have in mind?"

[SH: This would seem to match CA simple rules and complex behavior which also appears to show complicated rules and simple behavior.]

Woflram:
"He pointed to the sequence of prime numbers, or the digits flowing forth from calculations of pi as something science has heretofore regarded as "a nuisance, or a distraction or a bug of some sort − not an important basic phenomenon." But the apparent randomness of these numbers has at least one satisfying aspect: the more complicated things look, the more we are likely to ascribe "naturalness" to them."

"We want (model) systems whose behavior we can readily predict and see," Wolfram said, "but nature operates under no such constraint." What models of natural systems can mathematics potentially evoke, he wondered? "I happen to think all of the universe and physics, but that's another lecture."

http://www.wolframscience.com/reference/notes/876b
"By the end of the 1950s it had been noted that cellular automata could be viewed as parallel computers, and particularly in the 1960s a sequence of increasingly detailed and technical theorems − often analogous to ones about Turing machines − were proved about their formal computational capabilities.

In the late 1950s and early 1960s schemes for electronic miniaturization and early integrated circuits were often based on having identical logical elements laid out on lines or grids to form so−called cellular arrays. In the early 1960s there was for a time interest in iterative arrays in which data would be run repeatedly through such systems. But few design principles emerged, and the technology for making chips with more elaborate and less uniform circuits developed rapidly. Ever since the 1960s the idea of making array or parallel computers has nevertheless resurfaced repeatedly, notably in systems like the ILLIAC IV from the 1960s and 1970s, and systolic arrays and various massively parallel computers from the 1980s. Typically the rules imagined for each element of such systems are however immensely more complicated than for any of the simple cellular automata I consider."

SH: I wonder if you define the universe as fundamentally mathematical and computational whether that means CA rules are equal to mathematical axioms?

Regards,
Stephen

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One cannot avoid making mistakes if one
tries to produce a set of words, or of
mathematical formulae, to describe nature.
Nature is more complicated than language
or mathematics. Nevertheless, one must
do one's best to produce a set of symbols
which are not too discordant with the facts.
Surely thought is richer than language,
just as nature is richer than thought.
J.B.S. Haldane
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