Re: Question on Chaitin

Source: http://sci.tech−archive.net/Archive/sci.logic/2005−05/msg00188.html

- *From*: "Stephen Harris" <cyberguard1048−usenet@xxxxxxxxx>
- *Date*: Thu, 19 May 2005 07:58:27 GMT

"Chris Menzel" <cmenzel@xxxxxxxxxxxxxxxxxxxx> wrote in message
news:slrnd8nob8.uu.cmenzel@xxxxxxxxxxxxxxxxxxx
> On 18 May 2005 17:29:28 −0700, examachine@xxxxxxxxx
> <examachine@xxxxxxxxx> said:
>> ...
>> I've tried to correct some of your ignorant claims about philosophy
>> of computation. And in response I got very nasty posts from you.
>>
>> Once you were saying that Turing Machines can compute things that
>> no physical computer can compute.
>
> Er, isn't that rather obviously true?
Replay is not focused on Chris Menzel's comment
>

INCOMPLETENESS, MECHANISM, AND OPTIMISM. STEWART SHAPIRO. Overview.
Philosophers and mathematicians have drawn lots of conclusions from
Godel's ... www.math.ucla.edu/~asl/bsl/0403/0403−002.ps

Idealization: "One problem is that the exact content of the mechanistic
thesis is usually left unspecified. To belabor the obvious, the relevance
of the incompleteness theorems to mechanism depends on what the mechanist
claims. The raw thesis that the human mind is, or can be
modeled as, a digital computer or Turing machine, is too vague to apply
anything as sharp and delicate as the Godel theorem and the Turing−Feferman
extensions.

My conclusion (perhaps slightly exaggerated) is that there is no
plausible mechanist thesis on offer that is sufficiently precise to be
undermined by the incompleteness theorems.
The mechanist claims that there can be a machine whose outputs are the
same as those of a human or a group of humans. What sort of machine?
What outputs? What aspect of what human? As for "output" , let us stick
to propositions that can be rendered in the language of first−order Peano
arithmetic. Penrose [23] goes so far as to restrict the output to II1−
sentences. The totality of arithmetic sentences that a given person
asserts in his lifetime is finite. The same goes for the totality of

sentences asserted by any finite collection of humans, such as the professional mathematicians who lived or will live before the sun goes cold. Moreover, the totalities in question are certainly inconsistent. It only takes one mistaken calculation, later corrected.

The mechanist might claim that there could be a machine whose output is one of these finite sets, or the truths among one of these sets, or the logical consequences thereof. If so, the incompleteness theorems are irrelevant. Things get interesting only when we idealize, but things also get murky. Presumably, the mechanist and anti−mechanist are both talking about what an ideal human, or the community of ideal human mathematicians, can prove or know for certain. Lucas and Penrose both refer to human abilities "in principle". Of course, we must idealize on the "machines" as well. Like humans, actual digital computers have fixed limits on memory, and they are subject to hardware malfunctions and software bugs. I do not know if there could be a physical computer that matches a human being, reproducing both veridical output and error. I also do not know if there could be a physical computer whose output matches one of the finite sets in the previous paragraph. For all I know, it might not be physically possible to build a computer that big. Moreover, no actual computer can print all and only the logical consequences of one of those sets, since there are infinitely many such consequences, and we have good empirical confirmation that any machine will crash eventually. But all of this is off the point of any mechanistic claim that is supposed to be settled by Godel's theorems. The idealizations on the machine side are familiar, similar to idealizations made throughout mathematics. We ignore finite limits and assume that our machines never run out of memory, space, time, and attention span. We also assume that they run indefinitely without crashing. Part of the idea is to enforce the familiar distinction between hardware and software, and then completely ignore the hardware. Another part of the idea is to ignore practical or theoretical problems with limited memory and storage.

In short,we deal with Turing machines, with their fixed programs and unlimited tapes. Some Wittgenstein−type worries about rule−following might come into play at this point, but I assume that things are pretty clear so far. There is no question of what set a given Turing machine enumerates, is there? If there is a question, set it aside."

SH: The above quote again distinguishes between the ideal, hypothetical logical device known as a Turing Machine and its abstract theoretical capacity, and the real, practically realized (but not completely/exactly) capacity of an actual digital computer, which is limited by physical restraints when discussing the theoretical _potentials_ from a philosophical view.

It is not that the abstract Turing device computes a different category of computable entities, but that physical restraints prevent the physical digital computer from computing the same depth or extent of any given potentially infinite computation. The digital computer is itself finite and limited by physical reality. The Turing machine is not itself finite, it is

an
ideal, not physically real so has no physical limitations. That is why a Turing machine has a greater capacity to compute more digits of some computation (such as the unending digits of Pi) in theory, even though a digital computer is using the same computabily principle and computing the same value = Pi.

A Turing machine is a concept and a digital computer does not exemplify all aspects of that concept. Turing machines have unlimited memory to hold a computed result; digital computers are always limited by the amount of physical substance in the universe to serve as a contaner for a computed result. Turing machines enjoy the abstract concept of eternity to grind out one finite digit of the infinite expansion of Pi, digit by digit.

Digital computers are instead limited by a finite amount of time to grind out the infinite expansion of Pi. IOW, if a physical computer can compute a zillion digits of Pi before the end of the universe in time; then a Turing machine can compute a zillion zillion (or more) digits of Pi because the Turing machine is a logical device (not physical) which operates outside the boundaries imposed by time when considering philosphical potentials. A TM is an abstract idea not a thing. A digital computer is a physical thing.

Having abstract notions like truth, beauty or the infinitude of prime numbers
are concepts not real things, they are imaginary ideals. That does not mean anybody has to buy into another abstraction that there is a realm of Platonic source to such abstract ideas. People have a notion of what the ideal notion of justice is long before they hear about the Platonic realm which is just a philosphical conjecture. They don't need to hear about or believe in a theoretical conjecture of a Platonic realm in order to grasp the notion of justice or think about the concept. Making such a link is just an exercise of the imagination.

And if wishes were horses, beggars would ride.

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- ***References***:
  - ♦ ***Question on Chaitin***
    - ◊ *From:* David Costa

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