

# Re: Turing Machines and Physical Computation

**Source:** <http://coding.derkeiler.com/Archive/General/comp.theory/2004-11/0269.html>

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**From:** Stephen Harris ([cyberguard1048-usenet\\_at\\_yahoo.com](mailto:cyberguard1048-usenet_at_yahoo.com))

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"Stephen Harris" <[cyberguard1048-usenet@yahoo.com](mailto:cyberguard1048-usenet@yahoo.com)> wrote in message news:...

>

> *"Eray Ozkural exa"* <[examachine@gmail.com](mailto:examachine@gmail.com)> wrote in message

> *news:320e992a.0411192203.273c945b@posting.google.com...*

>> *Hi Stephen,*

>>

>> *Now, I recall that you made this strange argument about Turing*

>> *Machines being able to do things that real computers cannot, because*

>> *they have an infinite tape. What an observation.*

>>

>>> *TMs are not meant to have physical constraints applied to them.*

>>

>> *Another assertion.*

>>

If you had ever bothered to read and comprehend TMs abstract construction you would already know this is not an assertion.

Name a physical restraint applied to a TM, that limits its ability to computability solve some problem.

You claim to have read Turing's 1936 paper. Well, visualizing this hypothetical device, a Turing machine, one could imagine the tape is like a typewriter tape, only infinitely long, and moving in both directions.

There are a finite number of keys on a typewriter satisfying the symbol requirement. Physical machines have three dimensions.

Turing tells us we can think of the tape as being one-dimensional:

"Computing is normally done by writing certain symbols on paper. We may suppose this paper is divided into squares like a child's arithmetic book.

In elementary arithmetic the two-dimensional character of the paper is sometimes used. But such a use is always avoidable, and I think that it will be agreed that the two-dimensional character of paper is no essential of computation. I assume then that the computation is carried out on one-dimensional paper, i.e. on a tape divided into squares."

SH: What object that exists in the physical world is one dimensional?  
The one dimensional object that I know about is a mathematical abstraction called a line, which has no physical existence. A Turing Machine is a logical mathematical abstract device/entity. That is why a TM fits in the same category as set theory, potential and actual infinities, which are also logical mathematical abstract concepts/constructs. These are abstract ideas not physical things like a PC. I've already provided several definitions of what a TM is, hypothetical/abstract device with an (potential) infinitely long tape.

I did not make an assertion, rather I stated the definition. You could only call it an assertion if you were unaware that I stated the well-known definition.

There is some philosophical debate about whether the tape is potentially infinite or finitely unbounded. That philosophical debate does not impact the basic definition that I used. A TM cannot have a physical constraint because a TM is not physical! A PC has physical restraints because it *\*is\** physical! Because the idea of a TM provided a basis for developing a physical computing device/machine, does not transfer in reverse the physical properties and limitations of a physical machine to the abstract machine just because it served as the conceptual basis for building the PC.

This all comes down to you not knowing the definition of a TM as an abstract device/idea, and not a physical device with physical constraints.

>> *Ignoring physical plausibility directly opposes physicalism. When we start talking about immaterial things, we are not making scientific statements, we are making metaphysical ones, and that is not a good sign if the metaphysical statements depict worlds that are not physically similar to our own. It is a matter of degree, which we can observe.*  
>>

Ideas are immaterial things. Not every idea of two wizards riding unicorns casting spells at each other is grounded in physical reality.

Physical theories, like quantum theory, are ideas about how reality works. They are not reality itself. Formal mathematical systems are not required to apply to reality. When there is an effort to make the formal system apply to reality, the mathematics are not physical reality. This mathematics then is an effort to represent reality as faithfully as possible. Mathematics is a collection of abstract ideas often about physical reality, not physical reality itself. This view is the opposite of mathematical platonism. It says that mathematicians invent mathematics to describe observed regularities in an applied sense, and that mathematicians can invent mathematics in a pure sense without the intention of having the mathematics describe reality.

## comp.theory: Re: Turing Machines and Physical Computation

This is the opposite view mathematical platonism which has mathematicians discovering pre-existing mathematical ideas in a non-material realm. I'm not defending mathematical platonism at all. I am asserting that mathematical

platonism is independent of Cantor's set theory and actual infinity. Actual infinity does not mean physically manifested, it is just another abstract concept.

Cantor's personal belief is independent of the value of set theory which was used in part to develop fiber bundles.

Humans having abstract ideas is not considered dualistic or anti-physicalism.

I think along with many people that Cantor invented (not discovered) set theory using his brain which produced ideas in his mind. That humans can have ideas that are more concrete versus more abstract is not considered an argument that consciousness is dualistic, thus anti-physical.

The word is abstract versus Platonic. Do you use abstract reasoning? It is not necessary to drag in a physical PC to dismiss Platonism, just use the word abstract, which is a type of counterfactual thinking, not a claim for a realm outside the universe. Penrose is a mathematical Platonist, but he doesn't claim that consciousness is beyond the scope of physics or outside the universe. You have associated and generalized Cantor's personal view/philosophy as if it were a requirement to develop set theory. It is not. Perhaps there is a recursive relationship between the abstract usage of an infinite tape and a TM, and the abstract usage of infinity involved with set theory. But that does not lead to a dualistic anti-physicalist description of consciousness; abstract reasoning has never been considered the same as existing in a platonic realm. Abstract ideas are a normal consequence of having physical brains producing a mind.

>> *The question is: how far from reality? The further you talk, the less*

>> *real your statements are, not just as real!*

>>

That is a precise description of your predicament. You don't know basic definitions and there are large gaps in your education about how these ideas relate to each other. That is what you use to manufacture your viewpoint and of course it is removed from reality. When you keep reading criticisms from people who say you don't know the definitions, it is really true. Definitions are a consensus reality and if you don't know them it is your picture of reality which is randomized, not the other people's picture which use accepted definitions and share the same general knowledge such as the difference between having abstract ideas and the conjecture of a Platonic realm of existence. The real part is that you are either an arrogant, ignorant, though intelligent young person, or you have a chemical brain imbalance which handicaps your ability to reason abstractly and you have forgotten or decided not to take your medication (though I don't know if meds help).

## comp.theory: Re: Turing Machines and Physical Computation

I'm not trying to insult you. This is an objective description which is why you keep having it repeated to you in various posts in other newsgroups. You try to pretend to be expert but keep making revealing remarks which show their are big gaps in your education (not sure of the reason why), some of your remarks are so fundamentally wrong that they are silly.

You keep writing as if Cantor's use of "actual infinity" makes a claim about embedding infinity in the real physical world. It does not, his actual infinity is just another abstract idea.

>> *At this point, I should remind you the famous Levin quote. Levin was  
>> Kolmogorov's student, so he probably has a better idea of this issue  
>> than you have.*

>>

>>> *A Turing*

>>> *Machine or potential sentence of a language (there is no pre-existing  
>>> specification that the sentence has to be of finite length) is not of*

>>> *this*

>>> *world.*

>>

>> *Of which world is it then? (^\_^) And you are saying this Platonist  
>> talk is not theology! You have just murdered physicalism.*

>>

That quote means that a TM is an abstract concept, a non-material mathematical object as opposed to a real world physical object with 3 dimensions. It does not invoke Platonism! Platonism and abstract reasoning are not the same thing. No human is required to do abstract reasoning in an out of this universe platonic realm.

Well, that is it. I'm tired of reading your nonsense. You keep mixing in ideas that are not relevant to the discussion and you don't know enough to know it.

>> *The latter camp has the precise terminology.*

>>

>>> *There is no*

>>> *physical time constraint applied to when the calculation has to be  
>>> completed.*

>>

>> *If you mean \*any\* computation. But a Turing Machine is a \*particular\*  
>> computer. Not just \*any\* computer. Let's pay attention to our  
>> language.*

>>

Of course I mean any computation. There are an infinite number of Turing machines which match up with an infinite number of possible computations. There is an infinite subset of computations that match with a TM, that can be computed on a TM and not a PC because

comp.theory: Re: Turing Machines and Physical Computation

a PC is physical, having a time constraint, which the TM is an infinite number of cases does not. Because a Universal Turing Machine (UTM) can be used to emulate this condition in infinitely many cases doesn't make my statement imprecise. Because a PC can compute some of same calculations that a TM computes, does not impute a physical time constraint to the TM, just because PCs always have time constraints. Bringing this up doesn't even make any sense.

You join Longley,  
Stephen