Mr Million v Oreb

The Urth list — 10 messages, 7 voices, 21 Apr 2002

https://urth.darkrealm.vip/thread/urth/3188

Nigel Price — 21 Apr 2002, 20:45

Apologies to hartshorn (no capital H, no terminal e). My friends the Hartshornes do spell their name with a capital "H" and a terminal "e", and that's probably why I wrote it that way. Sorry. Should have been concentrating...

> A cubic millimeter of brain has 14 kilometers
> of biological wiring packed into it. There
> is no comparion between the brain of any living
> creature and ANY contemporary computer.

A splendidly precise answer to my inane speculations.

Maybe the difference between Mr Million's implementation of a stored human personality and Oreb's, then, (apart from the obvious one that they appear in different books, written at different times, when the author may have had more or less experience of computer and/or completely different artistic intentions!) arises from the fact that Oreb's bird brain is already stuffed full to capacity with night chough subroutines (datatypes? function calls?), leaving relatively little room to spare for downloaded cyber-deities. Perhaps loading Scylla into Oreb is like installing two operating systems and a double boot option onto your PC. There was plenty of space when you were running just one OS, but it gets a bit crowded when you've got two.

Or then again, Oreb's characteristic speech pattern may be the result of some sort of "bottleneck" in the capacity of Oreb's speech centres.

Or maybe it just made him interesting and distinctive as a character.

> I won't comment on the Pharasees/Saducsees debate

I mentioned it once, but I think that I got away with it...

Nigel (no lowercase "W", no terminal "z")

Andy Robertson — 21 Apr 2002, 21:40 · follows Nigel Price

----- Original Message -----

> From: "Nigel Price" <nigel.a.price at virgin.net>
>
> intentions!) arises from the fact that Oreb's bird brain is already
> stuffed
> full to capacity with night chough subroutines (datatypes? function
> calls?),
> leaving relatively little room to spare for downloaded cyber-deities.

The trouble is, of course, that a human personality needs a human brain to hold it. A smaller brain will not do. Only a fraction of a human prsonality could be embedded in a chough .

Today we guess that the fastest supercomputers carry out about the same number of switching

events per second as a human brain does. But they are BIG and consume a LOT of power.

One can only assume that the cybernetics of Wolfe's future is far advanced over ours, because a handful of "cards" seem to be able to hold something like a human personality

> Perhaps loading Scylla into Oreb is like installing two operating systems
> and a double boot option onto your PC. There was plenty of space when you
> were running just one OS, but it gets a bit crowded when you've got two.

Candidly, organic data processing is not digital and it is probably impossible to "download" a human or animal mind into a computer, full stop. The whole buisness of the Holy Hues being visual downloading of personality is very, very, dodgy. But it is a familiar SF trope and Wolfe uses it well.

hartshorn

Jeff Wilson — 22 Apr 2002, 04:59 · follows Andy Robertson

> From: "Andy Robertson" <andywrobertson at clara.co.uk>
>
> ----- Original Message -----
> From: "Nigel Price" <nigel.a.price at virgin.net>
>
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> The trouble is, of course, that a human personality needs a human brain to
> hold it. A smaller brain will not do. Only a fraction of a human
> prsonality could be embedded in a chough .

There are numerous documented cases of microcephalics with normal mental functionality; a lot of the human brain is redundant, something that is mentioned as a performance boosting factor in "5HC". This can be read about in Carl Sagan's book _Broca's Brain_, somethign along with Ray Kurzweil's book would have been available to Wolfe during the 70s.

> Today we guess that the fastest supercomputers carry out about the same
> number of switching events per second as a human brain does. But they are
> BIG and consume a LOT of power.

Measuring raw switching events per second is misleading. The 10^11 neurons in the brain might change state 20-30 times a second each, for
2.5 2.5 x 10^12 switching events a second. However, almost 10 years ago, Pentium processors with 3.3 million transistors were running at 100 megahertz, for 3.3 x 10^14 switching events a second, and just consuming a few watts.

Ray Kurzweil writes on this sort of comparison extensively; at current rate of development, computers will approach the complexity of the human brain in terms of informational and interconnected capacity in about 30 years.

Jeff Wilson
How Am I Posting? 1-800-555-6789
"If your SecOp can see you, so can the enemy." -Cpt Law

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Andy Robertson — 22 Apr 2002, 07:49 · follows Jeff Wilson

----- Original Message -----

> From: "Jeff Wilson" <jwilson at io.com>
>
> There are numerous documented cases of microcephalics with normal mental functionality; a lot of the human brain is redundant, something that is mentioned as a performance boosting factor in "5HC".

I am begnning to have serious doubts about the "numerous microcephalics" being true, and I'd appreciate a link to a primary source (not a dodgy populist like Sagan). I have chased these rumors up before and they seem to come to nothing, or to ignore the fact that the "normal" person in fact has serious behavioral deficiencies, though they may score averaage on an IQ test. But I bow to correction on this point.

I agree that a human brain can work at half human size. After all, children manage! But not at 1/10 or 1/40 human size.

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> Pentium processors with 3.3 million transistors were running at 100 megahertz, for 3.3 x 10^14 switching events a second, and just consuming a few watts.
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> Ray Kurzweil writes on this sort of comparison extensively; at current rate of development, computers will approach the complexity of the human brain in terms of informational and interconnected capacity in about 30 years.

Thanks for the correction. But the "30 years to equality" figure is one I have heard before. Indeed I was hearing it 30 years ago, and I suspect we will be hearing it 30 years from now.

hartshorn

David DiGiacomo — 22 Apr 2002, 18:21 · follows Andy Robertson

> The trouble is, of course, that a human personality needs a human brain to hold it. A smaller brain will not do. Only a fraction of a human prsonality could be embedded in a chough .

This is still unknown. Perhaps the personality is stored only in the human-specific parts of the brain, which are a fraction of the total size. If the information were organized efficiently, and non-essentials removed, it might be possible to find room for it in a smaller brain.

> Today we guess that the fastest supercomputers carry out about the same number of switching events per second as a human brain does. But they are BIG and consume a LOT of power.

I don't think today's computers have anywhere near the storage capacity of an animal brain.

> Candidly, organic data processing is not digital and it is probably impossible to "download" a human or animal mind into a computer, full stop.

The conclusion may be valid, but the premise doesn't support it. Audio signals are not digital, but we have no problem downloading music into our computers.

(There is also no technical obstacle to incorporating analog circuits in computers.)

> The whole buisness of the Holy Hues being visual downloading of personality is very, very, dodgy. But it is a familiar SF trope and Wolfe uses it well.

The downloading is questionable enough, but what about the uploading?!? Just how do the bios of the Whorl transmit information through their eyes? All I can think of is that the upload version

of the Holy Hues triggers evoked potentials which can be detected in some way, but that's not very satisfying.

Grant Peacock — 22 Apr 2002, 18:15 · follows David DiGiacomo

> --- Jeff Wilson wrote:
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I'm not sure this is number makes any sense. A 100 meg processor executes a maximum of 10^8 operations per second, no matter how much memory it has available.

My source of information is _I am Right, You are Wrong_ by Edward de Bono. I recommend this book. Unfortunately my copy is on loan so I might miss a lot of details here. The computing knowledge is also shaky. But here goes. A neuron has 2 states, firing and not firing, but don't let this fool you into thinking of the brain as binary. A neuron also has dendrites pointing to dozens of other neurons, and it also has a variable stimulation threshold. That is, it needs a certain amount of "juice" from neurons that point to it before it fires. This limit changes depending on the amount of time since it fired previously, and on levels of whatever chemicals to which it is sensitive. Finally, the amount of influence one neuron has over another can be increased over time. This happens when two connected neurons fire at the same time.

So, without too much effort to be efficient about the coding, let's estimate how much computing power one would need to try to simulate a brain, using a standard style of computer. For each neuron, we need a list of other neurons to which this one has a dendrite, and the sensitivity of each. Here we're talking probably 3 bytes * 20 or 30 neurons. This is the hard part, space-wise. Keeping it on a disk would be way too slow -- I think it has to be in memory. So we need about 100 bytes per neuron, or 10^7 megs of RAM. This is 10,000 times the memory of today's PC but it is conceivable.

Now, the real bottleneck is that we only have one processor. We can only look at one neuron at a time. The processor will have to make "passes" through the entire list of neurons. For each pass, on each neuron which is firing, it will go down the list of dendrites and add the right amount of juice to all the neighbors. Let's suppose that a maximum of 10% of a brain's 10^11 neurons can be firing at any given time. Still, that's 10^10 * 20 additions that must be performed in the slow part of the pass. (I'm assuming an average of 20 dendrites/neuron, this may be too low.) Adding probably takes more than 8 or 10 clock cycles but let's say 10. So each pass takes on the order of 10^12 clock cycles.

Now, when we consider that a neuron might go on and off 20 times per second, I'd say the passes I just described need to be performed at least 1000 times per second to achieve realistic brain activity. So our processor needs to run at around 10^16 hertz, that is, do the work of 100 million pentiums.

The reason we're still behind by such a large factor is that each neuron is not just a memory cell, it also performs some of the functions assumed by the processor in a computer.

-Peacock

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matthew.malthouse — 23 Apr 2002, 11:57 · follows Grant Peacock

> On 22/04/2002 19:21:47 david wrote:
> The downloading is questionable enough, but what about the uploading?!?
> Just how do the bios of the Whorl transmit information through their
> eyes?
> All I can think of is that the upload version of the Holy Hues triggers
> evoked potentials which can be detected in some way, but that's not very
> satisfying.

This is entirely speculative as I don't think there's any supporting text but it would make sense if as you suggest the Holy Hues were a trigger rather than a mechanism. Perhaps akin to the susceptibility some epileptics have to stroboscopic effects.

After all Pas had the opportunity to modify the 'cargo' when loading the Whorl to insert any 'equipment' required and this is a universe where a person's life experience can be assimilated by the ingestion of a finger's worth of (cooked!) flesh and a preperation of a xenoc animal's gland.

Actually I don't think that the 'how' has any pertinant significance to the understanding of the text: what has is that the process works.

Matthew

Jeff Wilson — 24 Apr 2002, 06:03 · follows matthew.malthouse

> From:
> Grant Peacock <grantpeacock at yahoo.com>
>
> --- Jeff Wilson wrote:
>
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> maximum of 10^8 operations per second, no matter how much memory it has
> available.

Not true; many processors have multiple instruction piplines inside that let them do multiple operations each clock cycle. A Pentium I averaged one instruction per Hertz, but that averages includes instances where it can do two operations at once, each taking a couple of cycles to complete. Later processors do even better, as they finish operations sooner and are more likely to be able to handle dual instructions in tandem. Regardless of the external speed, the processor is still made up of millions of interconnected transistors, each of which can change state hundreds of millions, and lately, billions of times per second.

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> recommend this book. Unfortunately my copy is on loan so I might miss a lot of
> details here. The computing knowledge is also shaky. But here goes. A neuron
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> other neurons, and it also has a variable stimulation threshold. That is, it
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> fires. This limit changes depending on the amount of time since it fired
> previously, and on levels of whatever chemicals to which it is sensitive.
> Finally, the amount of influence one neuron has over another can be increased
> over time. This happens when two connected neurons fire at the same time.

This sounds similar in scope to the interconnected transistor architecture inside a microprocessor; their exact configuration and levels of influence on one another is also adjustable nowadays, thanks to the embarrassment over bugs publicly discovered in previous generations of chips.

> So, without too much effort to be efficient about the coding, let's estimate how much computing power one would need to try to simulate a brain, using a standard style of computer. For each neuron, we need a list of other neurons to which this one has a dendrite, and the sensitivity of each. Here we're talking probably 3 bytes * 20 or 30 neurons. This is the hard part, space-wise. Keeping it on a disk would be way too slow -- I think it has to be in memory. So we need about 100 bytes per neuron, or 10^7 megs of RAM. This is 10,000 times the memory of today's PC but it is conceivable.
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> Now, the real bottleneck is that we only have one processor. We can only look at one neuron at a time.

This is wrong; there's no need to limit the computers to one processor apiece. Multiprocessor computing is old hat, in fact the ancient ENIAC had separate processing in each of its 64 interconnectable modules. Hardwire multiprocessor designs run into the tens of thousands, letting us simulate physical processes at subatomic levels; try googling for ASCI White. You might also try reading about Beowulf clusters; freely downloadable software exists to let you join arbitrary numbers of networked computers into a virtual multiprocessing machine. A Beowulf cluster of 100 rackmounted PCs with 10,000 megs of RAM each would take up about as much room as Mr. Million
Even if you are supposing the brain is to be simulated on a single processor, general purpose machine instead of a special purpose mechanism like Mr. Million, procs today are being designed with SIMD instructions; Single Instruction, Multiple Data. A SIMD instruction to add could be defined; it would quickly sum the adjacent neuron's juice x sensitivity values and return true if they exceed the central neuron's threshold. This would not be much different from the digital signal processing used to de-blur photographs and reduce audio noise.

> The processor will have to make "passes" through the entire list of neurons. For each pass, on each neuron which is firing, it will go down the list of dendrites and add the right amount of juice to all the neighbors. Let's suppose that a maximum of 10% of a brain's 10^11 neurons can be firing at any given time. Still, that's 10^10 * 20 additions that must be performed in the slow part of the pass. (I'm assuming an average of 20 dendrites/neuron, this may be too low.) Adding probably takes more than 8 or 10 clock cycles but let's say 10. So each pass takes on the order of 10^12 clock cycles.
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> The reason we're still behind by such a large factor is that each neuron is not just a memory cell, it also performs some of the functions assumed by the processor in a computer.

Good reasons for multiprocessing and other options I mentioned above. A neuron is much more complex than a transistor, but much less so than a microprocessor. It would not be inconceivably difficult to design a computing device with thousands or millions of subordinate computing elements to simulate the effects of individual neurons, and to coordinate their action in ways suitable to model the way real neurons are connected. Hans Moravec and his ilk are keen on doing it.

Jeff Wilson
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Michael Straight — 24 Apr 2002, 17:35 · follows Jeff Wilson

> On Mon, 22 Apr 2002, David DiGiacomo wrote:
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> evoked potentials which can be detected in some way, but that's not very
> satisfying.

Maybe this is what you mean by "evoked potentials," but I always assumed that the eye thing was merely a trigger, that the Holy Hues put the brain into some sort of receptive state so that some sort of electromagnetic doohicky could read/write to the brain directly, not actually transferring data through the optic nerve.

-Rostrum

Andy Robertson — 24 Apr 2002, 16:34 · follows Michael Straight

----- Original Message -----

> From: "Michael Straight" <straight at email.unc.edu>
> Maybe this is what you mean by "evoked potentials," but I always assumed
> that the eye thing was merely a trigger, that the Holy Hues put the brain
> into some sort of receptive

TBOTLS is among other things a retrospective of SF.

Here, we see Cyberpunk being treated.

The main idea of Cyberpunk was to take "cyberspace" and fuse it with the Spirit world. Cyberspace becomes the place where the Gods live, where you dream, where you may go after death. It is this (utterly uncientific) idea that gave Gibson's first novels their tremndous punch.

Wolfe is nodding to this, among other things.

harthsorn