Re: AI and cognitive psychology rant (getting more and more OT − tell me if I should shut up)

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From: Stephen Horne (*steve_at_ninereeds.fsnet.co.uk*)
Date: 10/30/03

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Date: Thu, 30 Oct 2003 17:36:27 +0000
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On 29 Oct 2003 23:26:05 −0800, mis6@pitt.edu (Michele Simionato)
wrote:

>Stephen Horne <steve@ninereeds.fsnet.co.uk> wrote in message news:
><snip some argument I would agree>
>> Perhaps cats simply don't have a particle/wave duality issue to worry
>> about.
>
>I have got the impression (please correct me if I misread your posts) that
>you are invoking the argument "cats are macroscopic objects, so their
>ondulatory nature does not matter at all, whereas electrons are
>microscopic, so they ondulatory nature does matter a lot."

That is *far* from what I am saying.

I find some explanations of superposition and decoherence difficult to
believe *because* they seem to differentiate between the microscopic
and macroscopic scales. MWI is one − the appearance is that
macroscopic objects in superposition get a different universe for each
superposed state (because there is no visible artifact of the
superposition − the observer is only in one universe) whereas for
microscopic objects in superposition there is no different universe
(as there are clear artifacts of the superposition, showing that the
superposed states interacted and thus existed in the same universe at
the same time).

I equally find the 'conscious mind has special role as observer'
hypothesis hard to accept as we have ample evidence that the universe
existed for billions of years before there were any conscious minds
that we know of. The evidence suggests that conscious minds exist
within the universe as an arrangement of matter subject to the same
laws as any other arrangement of matter.

In both cases, there is no issue of proof or logic involved. It's more
a matter of credibility − and with the conscious mind concept in
particular, of explanatory value. As far as science has studied the

mind so far all the findings show it to be an arrangement of matter following the same laws of physics and chemistry that any other arrangement of matter follows. There is no sign of an outside agency creating unexplainable artifacts in the brains functioning. And if there is no role for a thing outside of the brain to be generating consciousness − if the consciousness we experience is a product of the brain − then what role does this other consciousness have?

While I have a tendency to confuse his name (I think I called him Penfold earlier, though what Dangermouse' sidekick has to do with this I really can't say!), I prefer Penrose' theory where the microscopic and macroscopic really are different − not because they follow different rules, but because the time that a superposition can survive is inversely related to the uncertainty it creates in space−time. Have a lot of mass in substantially different states (e.g. a cat both alive and dead, or for that matter a vial of poison both broken and intact) and the superposition can only survive for a tiny portion of a second.

I'm not sure if this is the same Penrose who speculates that superposition of brain states is important to creating consciousness. It would be odd if it is, of course, as a brain is clearly macroscopic. But then he could mean something else − many superpositions of particles within the brain. As long as each created superposition only a small local uncertainty in space time (ie no substantial 'hotspots' of superposition), this accumulation of microscopic superpositions could be consistent − though to be honest I seriously doubt it.

As should be clear, my understanding of the specifics of quantum theory is extremely limited − but my understanding of general scientific principles isn't too bad. That is why I earlier pointed out that maybe the MWI wouldn't cause me such a problem if it was expressed in some other way − after all, most current theory is so abstract that the explanations should be taken as metaphors rather than reality anyway.

>This kind of arguments are based on the de Broglie wavelenght concept and
>are perfectly fine. Nevertheless, I would like to make clear (probably
>it is already clear to you) that quantum effects are by no means
>confined to the microscopic realm. We cannot say "okay, quantum is
>bizarre, but it does not effect me, it affects only a little world
>that I will never see". That's not true. We see macroscopic effects of
>the quantum nature of reality all the time.

No problem with that, but we are seeing microscopic effects en masse rather than macroscopic effects − something rather different, in my mind, to a cat being both alive and dead at the same time. For example...

> Take for instance
>conduction theory. When you turn on your computer, electron flow

>through a copper cable from the electric power plant to your house.
>Any modern theory of conduction is formulated as a
>(non−relativistic) quantum field theory of an electron gas
>interacting with a lattice of copper atoms. From the microscopic
>theory you get macroscopic concepts, for instance you may determine
>the resistivity as a function of the temperature. The classical
>Drude's model has long past as a good enough explanation of
>conductivity. Think also to superconductivity and superfluidity:
>these are spectacular examples of microscopic quantum effects
>affecting macroscopic quantities.

Of course. But none of these requires a macroscopic object to be superposed. It may require many microscopic objects to have been superposed, over and over again (I really don't know how, or even if, superposition is really involved in these effects − but let me argue the principle anyway) − but that isn't the same thing. Taking Penrose' theory again, each individual superposition only creates a small local uncertainty in spacetime. As long as the many separate superpositions are spread out in space and time, there will be no particular 'hotspots' where superposition would brake down. In fact, any coincidental hotspots of uncertainty would accelerate decorence of superpositions in that region and thus act as a stabilising or limiting factor in setting the amount of superposition that can occur in any region.

I would suggest that this limiting thing would be a useful artifact to look for − or at least some useful artifact might be suggested by the idea − that could be tested for to proove or disproove the theory. This limiting effect wasn't mentioned in the article, BTW − maybe Penrose hasn't thought of it (he proposed to look for artifacts of a single superposition which cannot be measured using current technology).

Maybe superfluids would be the place to look for that artifact. Maybe there is something in the shells of electrons around a nucleus − I'd certainly expect quantum wierdness there.

But of course I wouldn't have a clue what kind of artifact to look for, as my understanding is strictly limited to the 'I've read new scientist on occasion' level.

>Finally, the most extreme example: quantum fluctuations
>during the inflationary era, when the entire observable universe
>has a microscopic size, are finally responsible for the density
>fluctuations at the origin of galaxies formation. Moreover, we
>observe effects of these fluctuations in the cosmic background
>radiation, i.e. from phothons coming from the most extreme
>distance in the Universe, phothons that travelled from billions
>and billions of light years. Now, that's macroscopic!

Of course, but the quantum effects are not particularly interesting in that case. Or rather they are to cosmology, but not as far as I can see to understanding quantum theory. It's a bit like looking at an image from an electron microscope and claiming that an atom is several mm wide − the artifact that you are observing has simply been scaled up relative to the process that created that artifact. The effects when they occured were on the microscopic scale − only the artifacts are macroscopic.

−−
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