Re: functions that halt

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From: Barb Knox (*see_at_sig.below*)
Date: 04/16/04

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In article <407E4EFC.95362B72@msgid.michael.mendelsohn.de>,
Michael Mendelsohn <keine.Werbung.1300@msgid.michael.mendelsohn.de> wrote:

>The Ghost In The Machine schrieb:
>> In sci.logic, |−|erc
>> > Does it disprove Barbs diagnonalistion attack on a theory of
>> > guaranteed halting functions being equivalent in power to the
>> > class of TMs?
>>
>> Yes, as the diagonalization function cannot be placed in a TM.
>
>Oh, but it can.
>
*>The point of the guaranteed halting functions (GHF) is that you *can**
>enumerate them, i.e. you can write a function that gives you the k'th
>GHF.

No you can't. That was the whole point of the diagonal proof I posted originally:
IF there were some total F such that F(i) = an encoding of the i'th total function on N−>N (the i'th "GHF" in your terms), then any diagonal DF constructed so that DF(j) =/= F(j)(j) is clearly not in the F list −− for each F(i), DF is different from it (in particular, it is guaranteed to be different for input i).

>If you grant a mechanism that allows to to actually call such a
>function, or, what amounts to the same thing, "emulate" it (i.e. parse
>it and see what it does), you can write the diagonalisation function
>(DF).

Exactly right. And of course you *can* emulate it (e.g. via a Universal Turing Machine).

>The only problem is that you can't guarantee the DF to halt if it is a
>GHF,

?? By *definition*, a total function (a "GHF") is guaranteed to halt on all inputs. So if DF is a total function then it clearly must halt, even when the

input is an encoding of itself.

>because it then calls itself (or a simile of itself) in an infinite
>recursion.

No it doesn't.

>In other words, there is no contradiction if the diagonalisation
>function is not a GHF.

That would be true, but BY CONSTRUCTION of DF it *is* a total function, since it's simply a slightly modified version of F, which is ASSUMED (incorrectly it turns out) to be a total function.

But you're making progress (unlike, e.g., "Herc", who has ideological reasons for refusing to understand diagonal arguments in general).

>Michael

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