Re: A modern view of the halting problem

Source: http://coding.derkeiler.com/Archive/Assembler/alt.lang.asm/2006−10/msg00579.html

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- *Date*: Sun, 22 Oct 2006 20:53:37 −0700

On 22 Oct 2006 15:15:08 −0700
"randyhyde@xxxxxxxxxxxxx" <randyhyde@xxxxxxxxxxxxx> wrote:

:"Gödel's Theorem has been used to argue that a computer can never be
:as smart as a human being

Your incorrect use of such citations shows that you need to visit http://www.sm.luth.se/~torkel/eget/godel.html, but since you probably won't, here are a few tidbits from the site:

Every day, Gödel's incompleteness theorem is invoked on the net to support some claim or other, or just to whack people over the head with it in a general way.
.. . .
Unsurprisingly, the bulk of these invocations covers a range from the nonsensical to the merely technically inaccurate, and they often give rise to a flurry of corrections and more or less extended technical or philosophical disputes.
.. . .
There are two main types of references to stepping or standing "outside the system" in connection with Godel's theorem, one of which is correct and the other incorrect. These two categories will be illustrated by two quotations.

First, a correct version:

"The mathematician Godel proved that a system of axioms can never be based on itself: statements from outside the system must be used in order to prove its consistency."

This makes good sense, since a consistent system T subject to Godel's theorem can't prove its own consistency (or, equivalently, can't prove the so−called Godel sentence for system T, which for all the usual systems T is equivalent in T to "T is consistent"). Thus, to prove the consistency of T it is necessary to "step outside the system" T in the sense of "bring to bear some principle not contained in T itself". It should be noted, however, that this does not mean that the consistency of T can only be proved in a system stronger than T. All that follows is that to prove the consistency of T, some principle must be used which is not contained in T itself.

"Now an incorrect version:

"Godel's theorem states that in any consistent system which is strong enough to produce simple arithmetic there are formulae which cannot be proved−in−the−system, but which we [standing outside the system] can see to be true."

On the net and elsewhere, one can one can expect to encounter many startling claims about the implications of Godel's theorem for the powers of the human mind. The following has actually appeared in print:

"Church's theorem states the existence of an absolutely undecidable statement. This statement is produced by combining the Goedel sentences of all formal systems together... Church took all those unprovable statements and made one new statement from them, thereby arriving at a statement which remains undecidable no matter what formal systems we introduce. However, interestingly, even this "Church−sentence" is decidable by humans: in fact it is pre−decided through its contruction by Church. Church defined it so we can know: this statement is actually true. We can demonstrate this truth but no formal system can."

It's unclear exactly what the author has in mind, but there is not in fact any such "Church sentence". What is usually called Church's theorem states that there is no algorithm for determining whether or not a sentence in the formalism of predicate logic is logically valid.

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