

Re: Turing completeness of the functional paradigm?

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- *From:* Chris Menzel <cmenzel@xxxxxxxxxxxxxxxxxxxxxx>
 - *Date:* 18 Jul 2005 17:25:49 GMT
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On Mon, 18 Jul 2005 17:42:09 +0100, Robert Low <mtx014@xxxxxxxxxxxxxxxxxx> said:

> Babylonian wrote:

>> PA does not define a unique notion of natural numbers. No formalism
>> ever will.

>

> By 'formalism' do you mean 'first order'? Because there are certainly
> sets of axioms which uniquely define the natural numbers: the second
> order Peano axioms do this.

Assuming, of course, a standard model theory for second-order languages. As I'm sure you know, though, there is also a "general" model theory for second-order languages that Henkin introduced in proving the completeness of simple type theory, and second-order languages interpreted by this model theory are no more expressive than first-order languages. Hence, so interpreted, second-order PA has nonstandard models. But standard, second-order *model theory* is no more forced upon us by the axioms of second-order PA alone than is the standard *model* forced upon us by the axioms of first-order PA. In this sense, anyway, it seems to me that Babs is right; the formalism alone isn't enough. You also need to make an assumption about the background model theory relative to which you are defining what it is for a theory to define a certain class.

Chris Menzel

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◇ *From:* Robert Low

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