

Re: Another way of expressing the difference between first order and second order languages?

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Source: <http://sci.tech-archive.net/Archive/sci.logic/2005-10/msg00392.html>

- *From:* "Owen" <oorionus@xxxxxxxx>
 - *Date:* Tue, 18 Oct 2005 21:11:29 -0400
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<andrewspencers@xxxxxxxx> wrote in message
news:1129595389.341061.181030@xx

> It seems to me that in a language with logical constants (including
> quantifiers and sentential connectives), variables, and nonlogical
> constants, the language is first order if it allows the quantifiers to
> apply only to variables or to nonlogical constants but not to both, and
> the language is second order if it allows the quantifiers to apply to
> both variables and to nonlogical constants. Is this a correct analysis?

No, it is not a correct analysis.

First order logic presumes that the variables are individuals.

Second order logic presumes that the variables are individuals and predicates of individuals, etc, etc..

For example in first order logic:

$ExFx$, $AxFx$, Fa , etc, presumes that 'a' and 'F' are constant expressions.

In second order logic: $EF(Fa)$, $ExEF(Fx)$, etc, are constant expressions.

> I've seen the analysis that applying quantifiers only to variables
> results in a first order language, and that applying quantifiers to
> both variables and nonlogical constants results in a higher order
> language, but I've not seen any analysis of a language which allows
> quantifiers to apply only to nonlogical constants but not to variables.
> But I suspect that actually my hypothetical language is actually the
> same thing as a standard first order language, with effectively just
> the definitions of "variable" and "nonlogical constant" swapped. Hence
> my question.
>
> This leads to the further question which I posted here in another
> thread a few minutes ago (message
> <1129593284.845677.225340@xx>) about whether
> the labeling of a group of symbols as "variables" instead of
> "nonlogical constants", and vice versa, is really not formally

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- > determined but instead is just a convention about the kinds of
- > interpretations normally applied to those groups of symbols, with the
- > only formal distinction being that there are two separate groups of
- > symbols to which models can be applied independently.
- >

• **References:**

◆ [**Another way of expressing the difference between first order and second order languages?**](#)

◇ From: andrewspencers

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