

# Re: Why are rules of inference not laws of sentential calculus?

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- *From:* David C. Ullrich <ullrich@xxxxxxxxxxxxxxxxxxxx>
  - *Date:* Sun, 02 Oct 2005 09:30:01 -0500
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On 1 Oct 2005 08:04:28 -0700, andrewspencers@xxxxxxxxxx wrote:

>timvaz\_059@xxxxxxxxxx wrote:

- >> Nope. Rules of proof are not stated in the formal language, but
- >> generally given in English. Formulas in a language are just collections
- >> of symbols put together according to particular rules. They can't tell
- >> you how to derive formulas from other formulas, which is why you need
- >> rules of proof.
- >But even if rules of proof are "generally" given in a natural language,
- >they can be given in a formal language, right?

Of course. But if we're talking about proofs for a formal language L then the rules of derivation are expressed in a language *\_other\_* than L.

- >If they can't be given
- >in a formal language, then automated theorem provers can't be created.

And if you think about it this shows exactly why the two are different.

I might write a sentential-calculus proof checker in Python. The formulas of sentential calculus will be part of the input to that program; the derivation rules will be part of the program itself.

- >And whatever language (natural or formal) in which the rules are given
- >is a metalanguage of sentential calculus, right?

That's a little vague. But never mind that, let's say it's right. If so it shows that the derivation rules are *\_not\_* formulas of the sentential calculus! Because the sentential calculus is *\_not\_* a metalanguage for the sentential calculus.

- >>  $((p \rightarrow q) \wedge p) \rightarrow q$  is a theorem of the sentential calculus, but this
- >> theorem is not the rule of detachment.
- >But can't the rule of detachment be stated in a formal language, and if
- >it can, then wouldn't it have the same form as this theorem of the

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>sentential calculus?

If so that does not show that they are the same thing!

>And furthermore, wouldn't its variables range over  
>the same things over which the variables of the aforementioned theorem  
>range (sentences in the sentential calculus)? If so, then I don't  
>understand why the rule and the theorem aren't the same thing, and why  
>the rule can't be written in sentential calculus, but has to be written  
>in a different formal language. And the answer can't be "because the  
>rule's variables range over sentences of the sentential calculus, and  
>such variables only exist in the metalanguage", because then the  
>aforementioned theorem couldn't be a theorem of the sentential calculus  
>either.

Look. Here's a typical derivation rule:

"If the current line is B and there exist previous lines of the form A  $\rightarrow$  B and A then the current line is correct."

Now show me a formula in the sentential calculus that says that.

Hint: You can't do that, because formulas in the sentential calculus do not say anything. In particular the tautology ((A  $\rightarrow$  B) and A)  $\rightarrow$  B does not mention lines in a proof.

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David C. Ullrich

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• *Follow-Ups:*

- ◆ **Re: Why are rules of inference not laws of sentential calculus?**  
    ◇ From: andrewspencers
- ◆ **Re: Why are rules of inference not laws of sentential calculus?**  
    ◇ From: |-|erc

• *References:*

- ◆ **Why are rules of inference not laws of sentential calculus?**  
    ◇ From: andrewspencers
- ◆ **Re: Why are rules of inference not laws of sentential calculus?**  
    ◇ From: timvaz\_059
- ◆ **Re: Why are rules of inference not laws of sentential calculus?**  
    ◇ From: andrewspencers

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