

# Re: theorem vs. metatheorem

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*Source:* <http://sci.tech-archive.net/Archive/sci.logic/2005-04/msg00016.html>

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- *From:* Tom Breton <[tehom@xxxxxxxxxxxxxxxxxxxxxxxxxxxx](mailto:tehom@xxxxxxxxxxxxxxxxxxxxxxxxxxxx)>
  - *Date:* 31 Mar 2005 22:33:26 -0500
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lkjh\_098@xxxxxxxxxxxx writes:

> Hi,  
>  
> I'm confused about the distinction between a theorem of logic and a  
> metatheorem. I notice that theorems use the logical symbols like '<->'  
> and '->', whereas metatheorems apparently can't use these logical  
> symbols but instead must use "corresponding" English terms 'if and only  
> if' and 'if\_\_then\_\_'. What is the difference, for instance, between  
> '<->' and 'if and only if',

For metalogic, one typically names a different set of connectives than for the logic, like "|-" (turnstile) instead of "->". This is basically done to keep the logic operations and the meta-logic operations distinct.

Some make an additional distinction: that meta-operations have executive power and non-meta-operations don't. Like, if you have "a", "a |- b" makes you conclude "b", but "a -> b" only makes the conclusion possible, and you have to apply the modus ponens rule to actually get "b" from that.

See here [http://en.wikipedia.org/wiki/Rule\\_of\\_inference](http://en.wikipedia.org/wiki/Rule_of_inference) (scroll to "Other Considerations") for another take on this.

> why do we need metatheorems in the first  
> place,

To reason about logic. Usually this is done in order to prove that a logic with non-standard rules has some property(s) of interest.

> and do we reason about metatheorems in the same way we reason  
> about theorems (i.e., using the same inference rules, like Leibniz or  
> modus ponens).

Generally yes, modus ponens etc are still applicable.

But there is nothing preventing you from reasoning about an ordinary logic using an exotic logic, or from reasoning about an exotic logic

using ordinary logic.

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Tom Breton, the calm-eyed visionary

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- *Follow-Ups:*

- ◆ *Re: theorem vs. metatheorem*

- ◇ *From: lkjh\_098*

- *References:*

- ◆ *theorem vs. metatheorem*

- ◇ *From: lkjh\_098*

- Prev by Date: *[FAQ, 99/07/28] Mathematical logic on the web*

- Next by Date: *Re: theorem vs. metatheorem*

- Previous by thread: *Re: theorem vs. metatheorem*

- Next by thread: *Re: theorem vs. metatheorem*

- Index(es):

- ◆ *Date*

- ◆ *Thread*