

Refutation of Isabelle/HOL prover assistant

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Abstract: A meta-rule for structural induction in the prover assistant Isabelle/HOL is *not* tautologous. This refutes the assistant and denies it can effect a cross-fertilization of computer science and metaphysics. Therefore Isabelle/HOL is a *non* tautologous fragment of the universal logic $\forall\exists\forall$.

We assume the method and apparatus of Meth8/ $\forall\exists\forall$ with Tautology as the designated proof value, **F** as contradiction, **N** as truthity (non-contingency), and **C** as falsity (contingency). The 16-valued truth table is row-major and horizontal, or repeating fragments of 128-tables, sometimes with table counts, for more variables. (See ersatz-systems.com.)

LET \sim Not, \neg ; + Or, \vee , \cup , \sqcup ; - Not Or; & And, \wedge , \cap , \square , $;$; \ Not And;
 $>$ Imply, greater than, \rightarrow , \Rightarrow , \mapsto , $>$, \supset , \Rightarrow ; $<$ Not Imply, less than, \in , $<$, \subset , \neq , \neq , \ll , \lesssim ;
 $=$ Equivalent, \equiv , $:=$, \Leftrightarrow , \leftrightarrow , $\hat{=}$, \approx , \simeq ; @ Not Equivalent, \neq ;
 $\%$ possibility, for one or some, \exists , \diamond , **M**; # necessity, for every or all, \forall , \square , **L**;
 $(z=z)$ **T** as tautology, **T**, ordinal 3; $(z@z)$ **F** as contradiction, \emptyset , Null, \perp , zero;
 $(\%z\>\#z)$ **N** as non-contingency, Δ , ordinal 1; $(\%z\<\#z)$ **C** as contingency, ∇ , ordinal 2;
 $\sim(y < x)$ ($x \leq y$), ($x \subseteq y$); $(A=B)$ ($A\sim B$); $(B>A)$ ($A\sim B$); $(B>A)$ ($A\neq B$).
 Note for clarity, we usually distribute quantifiers onto each designated variable.

From: Kirchner, D.; Benzmüller, C.; Zalta, E.N. (2019).
 Computer science and metaphysics: a cross-fertilization.
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1.2 Propositional S5 with Abstraction Layers.

Unfortunately, in our implementation we are lacking *structural induction*, i.e. induction on the complexity of a formula. For that reason, we also have to derive meta-rules for our target system from the semantics, e.g.,

lemma deduction: assumes "[w = p] \Rightarrow [w = q]"
shows "[w = p \rightarrow q]"
using assms apply transfer by auto (1.2.16.1)

$$((w=p)\>(w=q))\>(w=(p>q)) ; \quad \mathbf{FTTF \ FTTF \ FTTF \ FTTF} (8) ,$$

$$\mathbf{TTTT \ TTTT \ TTTT \ TTTT} (8) \quad (1.2.16.2)$$

Eq. 1.2.16.2 as rendered is not tautologous, hence denying structural induction on the Isabelle/HOL prover assistant. What follows is that the assistant is refuted and cannot effect a cross-fertilization of computer science and metaphysics.