

Review of

"A fully labelled proof system for intuitionistic modal logics"

by S. Marin, M. Morales and L. Strassburger

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This is a very well written paper (although it is a bit surprising that a not fully polished pdf has been submitted for reviewing: on pages 13 and 14 there are a couple of broken references “??”) that presents work that advances the state of the art in intuitionistic modal logics in an interesting way.

The paper is well structured and the authors do a very good job at explaining their motivations and formal results clearly and thoroughly.

The results are, perhaps, not particularly surprising, as one would expect the power of labelling to indeed allow for the definition of "cut-free deductive systems for a wide range of logics", but the authors have the clear merit to have formalized their calculus for the first time and proved some interesting properties.

For this reason, I think that the paper merits to be published, but more work is needed before it can be accepted for good.

The main issue is indeed with the "wide range of logics". While the base logic is discussed in detail, the range of logics is treated in an “Extensions” section that I believe could actually be more detailed. Most importantly, I am not convinced by the $gklmn$ rule. The side condition stipulates that y' and u are fresh, whereas the frame property contains existential quantifications. I was thus expecting either a Skolemization in the style of Vigano in the “Labelled Non-Classical Logics” book, or a geometric rule with existential quantification in the style of Simpson [Sim94] or, perhaps even better, a “mixed” rule where the labels are assumed more or less in the style of an \exists -elimination to derive a labeled formula. I think that a thorough discussion of the alternatives, along with a more thorough proof of the correctness of the chosen solution, is needed. By the way, it does not help at all that the applications of the rule $g1111$ are merged with \Box_L and \Diamond_R in the example derivation.

Also Remark 4.2 could benefit from some additional explanation. You write that the proof of Theorem 4.1 shows the “need” of the rules F_1 , $refl$ and $trans$. However, strictly speaking, the proof only shows how the rules are used and that they are helpful to prove the axioms. To show the “need” you would likely have to show that no other proofs of the axioms are possible. That is of course the case, but unless you prove it formally, it is not fully correct to claim that the “need” is shown. This is pedantic, I know.

Finally, I suggest that the authors reconsider the abstract, which, in my opinion, does not do their paper justice. It reads very “operational” and does not clearly state the contributions of the paper.