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SEMINÁRIO DE LÓGICA MATEMÁTICA

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Rational Reconstructions. Making Sense of Proofs with Inconsistent Premises

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Abstract:

Most mathematicians are classical or constructivist reasoners, so they think that contradictions lead to trivial theories, and the latter are disasters. Modern Western mathematicians make proofs. Often, these are only partly formal. Some of them use sets of premises that belong to theories that are inconsistent with each other. Some of them even use sets of premises that are inconsistent with each other in the stronger sense that it is possible to derive a contradiction from the premises. Even worse, few mathematicians seem perturbed by this. How do we explain the lack of concern?

First note that almost none of these proofs use an *ex contradictione quodlibet* proof or sub-proof, since this would explicitly bring disaster. We could use a paraconsistent logic to reconstruct the reasoning, but this would be disingenuous towards the beliefs and practices of working mathematicians. As an alternative, we can use a proof reconstruction strategy called 'chunk and permeate', developed by Brown (2004, 2016). The proof is divided into several consistent chunks, and only some information from one chunk permeates to the next chunk. I explain the strategy in more detail.

One problem that is still outstanding in the strategy is how to individuate consistent chunks. So far, this has been done intuitively. Following a suggestion by Abramsky et. al. (2015), we propose to make this less of an intuitive exercise by using bundle theory to represent chunks. In the conclusion, we discuss the limitations of this proposed solution to the outstanding problem. We then extend the method to include scientific reasoning. Finally, we draw some conclusions about the limitations of the method.

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