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Title: On modalities and multi-modalities

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Abstract: It is well known that context dependent logical rules can be hard to both, implement and reason about. This is one of the reasons for the quest for better behaved logical systems. In the case of modalities, local rules can be, in general, described using generalizations of sequent calculus systems. Locality in linear logic (LL) can be achieved, for instance, by using deep inference or 2-sequents.

In this work, we propose a general framework for describing systems based on multiplicative additive LL (MALL) plus simply dependent multimodalities. This class of systems includes linear logic with subexponentials (SELL) and hybrid linear logics. The chosen approach is linear nested sequents (LNS), a reformulation of 2-sequents. It turns out that LNS systems can be adequately encoded into (plain) linear logic, showing that LL is, in fact an "universal framework" for the specification of logical systems.

From the theoretical point of view, our results show that (1) logics such as SELL, that were thought to be more expressive than LL, are, in fact, equally expressive; and (2) it is possible to give a uniform presentation to linear logics featuring different axioms of modalities. From the practical point of view, our results: (3) lead to a generic way of building theorem provers for different logics, all of them based on the same grounds; and (4) allow for the use of the same logical framework for reasoning about all such logical systems.

This is a joint work with Björn Lellmann and Carlos Olarte