Applying a linear logic perspective to arithmetic

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Linear logic has revealed a great deal about proofs in classical and intuitionistic logics. For example, Andreoli's focused proof system for linear logic has been extended to focused proof systems for both classical and intuitionistic logics [6]. Such proof systems provide both flexible normal forms of proofs and control on the structural rule of contraction.

In this talk, I describe some initial work on attempting to move such linear logic techniques from logic to both Peano and Heyting arithmetics. An initial step in this direction has been the recent work by Baelde [1] where least and greatest fixed points have been added to MALL (multiplicative additive linear logic). The resulting logic and focused proof systems have been used to describe a proof theory behind model checking [2, 5]. Focusing proof systems for arithmetic have also been shown to form a basis for separating computation from deduction [3, 4]. I will also briefly describe work in progress with M. Manighetti to address more conventional topics in the proof theory of arithmetic using lessons learned from linear logic.

References

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