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STRUCTURAL RULES IN FL: EXPRESSIVE POWER AND CUT ELIMINATION.

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Full Lambek calculus (**FL**) is one of the most important Gentzen-style systems for substructural logics. The system admits cut elimination and is decidable. Axiomatic extensions of **FL** are known as substructural logics and they include, classical, intuitionistic, linear, relevant and many-valued propositional logics. Its algebraic semantics is the variety FL of pointed residuated lattices, also known as FL-algebras.

Although not all extensions of **FL** enjoy cut elimination, we show that *simple* structural rules preserve cut elimination. Structural rules over **FL** correspond in general to quasi-equations over FL, but we identify a large class of *separable* structural rules that correspond to equations. Moreover, although not all separable rules preserve cut elimination, we show that every separable rule is equivalent to a (simple) rule that does preserve cut elimination. We describe an algorithm for obtaining such a simple rule, while a similar algorithm can be applied to *separable* equations to obtain *simple* ones. On the other hand, we show that there are structural rules that are not equivalent to a rule that preserves cut elimination.

The proof of cut elimination for structural rules is obtained using the theory of residuated frames, structures that form relational semantics for substructural logics. As a by-product of the proof we obtain that simple, hence also separated, equations are preserved under Dedekind-MacNeille completions of FL-algebras (or residuated lattices).

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