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The equivalence of tree adjoining grammars and monadic linear context-free tree grammars. (English summary)

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A context-free tree grammar (CFTG) G is "linear" if it is non-duplicating, i.e., it does not allow the copying of subtrees in the derivation process. And G is "monadic" if all nonterminals have rank at most 1. With respect to leaf language generating power, monadic linear CFTGs (or MLCFTGs) are as powerful as tree adjoining grammars (TAGs) [A. K. Joshi, L. S. Levy and M. Takahashi, J. Comput. System Sci. **10** (1975), 136–163; MR0363014 (50 #15452)].

In the present paper the authors show that the class of tree languages generated by MLCFTGs equals the class of tree languages definable by non-strict TAGs. (Non-strictness was introduced earlier by the second author.) The proof relies on several intermediate steps via restricted CFTGs (non-deleting collapse-free MLCFTGs, footed CFTGs, spinal-formed CFTGs). Using a result of the second author [Theoret. Comput. Sci. **293** (2003), no. 2, 291–320; MR1964745 (2004k:03077)] it is shown that a tree language belongs to this class iff it is the two-dimensional yield of a three-dimensional tree language that is definable by monadic second-order logic.

Reviewed by *Peter R. J. Asveld*