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Pregroup grammars, their syntax and semantics. (English) Zbl 07440911

Casadio, Claudia (ed.) et al., Joachim Lambek: the interplay of mathematics, logic, and linguistics. Cham: Springer. Outst. Contrib. Log. 20, 347-376 (2021)

This paper is dedicated to Lambek's pregroup grammars [*J. Lambek*, J. Logic Lang. Inf. 17, No. 2, 141–160 (2008; Zbl 1162.68721)], the trouble with which has always been their semantics, or lack thereof. A cut-free sequent calculus has been developed for pregroups by *W. Buszkowski* [Math. Log. Q. 49, No. 5, 467–474 (2003; Zbl 1036.03046)], who has also shown that the expressive power of pregroup grammars, similar to that of the syntactic calculus [*J. Lambek*, Am. Math. Mon. 65, 154–170 (1958; Zbl 0080.00702)], is context-free [*W. Buszkowski*, Z. Math. Logik Grundlagen Math. 31, 369–384 (1985; Zbl 0559.68063)]. The set-theoretic semantics is, however, ambiguous, as a pregroup term abc^l has two interpretations, namely, $A \times C^B$ and $C^{A \times B}$.

This article studies the semantics of pregroup grammars, surveying recent advances in vector space modelling in natural language processing. Following a suggestion of Lambek, the author addresses finite-dimensional vector space semantics for pregroups, in which the adjoint types are to be interpreted as dual spaces. The author builds semantic vector representations for some exemplary words, phrases and sentences of language, showing how compositionality of vector semantics disambiguates meaning. Finally, the paper presents a vector semantics and analysis of questions, demonstrating how their representations relate to the sentences they are asked about.

For the entire collection see [Zbl 1470.03008].

Reviewer: Hirokazu Nishimura (Tsukuba)

MSC:

68T50 Natural language processing
03B65 Logic of natural languages
68Q42 Grammars and rewriting systems
91F20 Linguistics

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