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**Coherent diagrammatic reasoning in compositional distributional semantics.** (English)

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Summary: The framework of categorical compositional distributional models of meaning [3], inspired by category theory, allows one to compute the meaning of natural language phrases, given basic meaning entities assigned to words. Composing word meanings is the result of a functorial passage from syntax to semantics. To keep one from drowning in technical details, diagrammatic reasoning is used to represent the information flow of sentences that exists independently of the concrete instantiation of the model. Not only does this serve the purpose of clarification, it moreover offers computational benefits as complex diagrams can be transformed into simpler ones, which under coherence can simplify computation on the semantic side. Until now, diagrams for compact closed categories and monoidal closed categories have been used (see [2, 3]). These correspond to the use of pregroup grammar [12] and the Lambek calculus [9] for syntactic structure, respectively. Unfortunately, the diagrammatic language of Baez and Stay [1] has not been proven coherent. In this paper, we develop a graphical language for the (categorical formulation of) the nonassociative Lambek calculus [10]. This has the benefit of modularity where extension of the system are easily incorporated in the graphical language. Moreover, we show the language is coherent with monoidal closed categories without associativity, in the style of Selinger’s survey paper [17].

For the entire collection see [Zbl 1369.03021].

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diagrammatic reasoning; coherence theorem; proof nets; compositional distributional semantics

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