

**Lambek, J.**

**Compact monoidal categories from linguistics to physics.** (English) Zbl 1253.81013

Coecke, Bob (ed.), New structures for physics. Berlin: Springer (ISBN 978-3-642-12820-2/pbk; 978-3-642-12821-9/ebook). Lecture Notes in Physics 813, 467-487 (2011).

This expository paper surveys compact 2-categories, particularly compact strictly monoidal categories. The third section is devoted to a brief exposition of [the author and A. Preller, Math. Struct. Comput. Sci. 17, No. 2, 309–340 (2007; [Zbl 1151.18007](#))]. However, as the author admits, A. Joyal and R. Street [Adv. Math. 88, No. 1, 55–112 (1991; [Zbl 0738.18005](#))] have already carried out for monoidal categories what the author and Preller tried to do for strict monoidal categories. Compact 2-categories are called pregroups, provided that their 2-cells describe a partial order. The author is active in applications of pregroups freely generated by a partially ordered set to the grammar of natural languages ([the author, J. Logic Lang. Inf. 17, No. 2, 141–160 (2008; [Zbl 1162.68721](#)); Stud. Log. 100, No. 4, 667–681 (2012; [Zbl 1283.03061](#)); J. Logic Lang. Inf. 19, No. 1, 75–88 (2010; [Zbl 1183.91158](#)); From word to sentence. A computational algebraic approach to grammar. Monza: Polimetria 2008; [Zbl 1166.03315](#)); J. Logic Lang. Inf. 16, No. 3, 303–323 (2007; [Zbl 1160.03305](#)); J. Math. Log. 7, No. 2, 125–143 (2007; [Zbl 1150.03013](#)); Math. Intell. 28, No. 2, 41–48 (2006; [Zbl 1167.68453](#)); Res. Lang. Comput. 3, No. 1, 45–60 (2005; [Zbl 1083.68129](#))]. Applications of compact symmetric monoidal categories to physics can be seen in [the editor, “Introducing categories to the practicing physicist”, in: What is category theory?. Monza: Polimetria. 45–74 (2006; [Zbl 1148.18300](#))] and others, but the paper [the editor et al., Ann. Pure Appl. Logic 164, No. 11, 1079–1100 (2013; [Zbl 1280.03026](#))] is at best related with this paper. The author originally intended to show that Feynman diagrams for quantum electro-dynamics could be described by certain compact Barr-autonomous categories, only to find out that these degenerate to partially ordered groups. Therefore the author grudgingly presents an extension of the idea from QED to the standard model. The paper concludes with a brief review of the transition from 2-categories to the bicategories of J. Bénabou et al., [Reports of the midwest category seminar. Berlin-Heidelberg-New York: Springer-Verlag (1967; [Zbl 0165.33001](#))].

For the entire collection see [[Zbl 1200.00038](#)].

Reviewer: [Hirokazu Nishimura \(Tsukuba\)](#)

#### MSC:

[81P05](#) General and philosophical questions in quantum theory

[18D15](#) Closed categories (closed monoidal and Cartesian closed categories, etc.)

Cited in <b>1</b> Review
Cited in <b>3</b> Documents

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