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M. Andrew Moshier* (moshier@chapman.edu), 366 Keck Center, Chapman University, Orange, CA 92867. *Strings for Cartesian Bicategories*. Preliminary report.

Cartesian Bicategories (following Carboni and Walter *Cartesian Bicategories I*, J. Pure Appl. Algebra, 1989 vol. 49) are symmetric monoidal order-enriched categories in which each object is equipped with a comonoid of maps satisfying certain lax naturality conditions. The standard example is \mathbf{Rel} . But a more general example is the category $\overline{\mathbf{Pos}}$, consisting of partially ordered sets and *weakening relations*: relations R such that $a \leq a' R b' \leq b$ implies $a R b$.

The category $\overline{\mathbf{Pos}}$ is a setting in which morphisms act as generalized entailment relations, and which includes \mathbf{Rel} as the full subcategory of “discrete” objects.

In this talk, we present an initial (strict) cartesian bicategory for fixed signature by enriching a string diagrammatic category with order, exhibiting an inequality that fails in the initial category but holds in partially ordered sets.

Using the string diagrams, we discuss some applications by characterizing objects in a cartesian bicategory that are *lattice-like* (but in light of the foregoing result, may not be actual lattices). We then characterize those lattice-like objects that are distributive, and that are essentially Boolean. (Received September 03, 2019)