1153-18-32 **Tobias Fritz*** (tfritz@pitp.ca), Waterloo, Ontario , Canada. *A synthetic approach to stochastic maps, conditional independence, and theorems on sufficient statistics.*

We develop *categories with affine comonoids* as a formal framework for dealing with structural aspects of probability and statistics, following work of Cho and Jacobs. Our treatment includes conditioning and disintegration, various versions of conditional independence and its standard properties, conditional products, almost surely, sufficient statistics, and some basic theorems on sufficient statistics due to Fisher–Neyman, Basu, and Bahadur. In contrast to what one might expect, we achieve most of this without assuming the existence of conditionals. This implies that all of these results hold in the context of measure-theoretic probability with arbitrary measurable spaces. Besides the conceptual clarity offered by our categorical setup, its main advantage is that it allows for a uniform treatment of various types of probability theory, including discrete probability theory, measure-theoretic probability, Gaussian probability, Markov processes of either of these kinds, and many others. (Received August 05, 2019)