

D-Norms: A Leisurely Look at Multivariate
Extreme Value Theory
Prof. Dr. Michael Falk
(Universität Würzburg)

June 29, 2016

Multivariate extreme value theory (MEVT) is the proper toolbox for analyzing several extremal events simultaneously. Its practical relevance in particular for risk assessment is, consequently, obvious. But on the other hand MEVT is by no means easy to access; its key results are formulated in a measure theoretic setup, a *fil rouge* is not visible. Writing the 'angular measure' in MEVT in terms of a random vector, however, provides the missing *fil rouge*: Every result in MEVT, every relevant probability distribution, be it a max-stable one or a generalized Pareto distribution, every relevant copula, every tail dependence coefficient etc. can be formulated using a particular kind of norm on multivariate Euclidean space, called D-norm. Norms are introduced in each course on mathematics as soon as the multivariate Euclidean space is introduced. The definition of an arbitrary D-norm requires only the additional knowledge on random variables and their expectations.

But D-norms do not only constitute the *fil rouge* through MEVT, they are of mathematical interest of their own.

This talk provides a relaxed tour through essentials of MEVT, due to the D-norms approach. Quite recent results on multivariate records complete the talk. This talk is partially based on joint work with Clément Dombry and Maximilian Zott.