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   Sommario/riassunto This book focuses on Erdélyi–Kober fractional calculus from a statistical perspective inspired by solar neutrino physics. Results of diffusion entropy analysis and standard deviation analysis of data from the Super-Kamiokande solar neutrino experiment lead to the development of anomalous diffusion and reaction in terms of fractional calculus. The new statistical perspective of Erdélyi–Kober fractional operators outlined in this book will have fundamental applications in the theory of anomalous reaction and diffusion processes dealt with in physics. A major mathematical objective of this book is specifically to examine a new denition for fractional integrals in terms of the distributions of products and ratios of statistically independently distributed positive scalar random variables or in terms of Mellin convolutions of products and ratios in the case of real scalar variables. The idea will be generalized to cover multivariable cases as well as matrix variable cases. In the matrix variable case, M-convolutions of products and ratios will be used to extend the ideas. We then give a denition for the