

# On Conditional Tsallis Entropy †

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Tsallis entropy, a generalisation of Shannon entropy that depends on a parameter alpha, provides an alternative way of dealing with several characteristics of nonextensive physical systems given that the information about the intrinsic fluctuations in the physical system can be characterized by the nonextensivity parameter alpha. It is known that as the parameter alpha approaches 1, the Tsallis entropy corresponds to the Shannon entropy. Unlike for Shannon entropy, but similarly to Rényi entropy (yet another generalisation of Shannon entropy that also depends on a parameter alpha and converges to Shannon entropy when alpha approaches 1), there is no commonly accepted definition for the conditional Tsallis entropy. In this work, we revisit the notion of conditional Tsallis entropy by studying some natural and desirable properties in the existing proposals: when alpha tends to 1, the usual conditional Shannon entropy should be recovered; the conditional Tsallis entropy should not exceed the unconditional Tsallis entropy; and the conditional Tsallis entropy should have values between 0 and the maximum value of the unconditional version. We also introduce a new proposal for conditional Tsallis entropy and compare it with the existing ones.



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