Editorial

Entropy – New Editor-in-Chief and Outlook

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I became the Editor-in-Chief of *Entropy* in July 2008. As the new Editor-in-Chief, I would like to present my opinion on some changes regarding requirements for publishing in this journal.

Terminology and Entropy Concepts

Authors that publish articles in *Entropy* come from various fields. It is therefore obvious that they describe their problems using slightly different terminology. On the other hand, *Entropy* should bridge the different fields, and for this reason a more universal language is preferable. Often the authors in a special field simply do not know the terminology used in other fields. This should not be accepted in an interdisciplinary journal. For this reason we have decided to be more strict about the entropy related quantities that the authors use. For instance there is a one-to-one correspondence between Tsallis entropy and Rényi entropy, but that does not mean that it makes no difference whether one uses one or the other. For some problems Tsallis entropy may be more natural and for some problems Rényi entropy may be more useful. In all articles we publish, we will therefore require that the most suitable entropy concept is used – even if that means that the authors have to make major revisions in order to accomplish this requirement.

We also found that some of the submitted manuscripts use terminologies and notations from outdated textbooks. Information theory has developed much since Shannon, and *Entropy* will reflect this. Therefore, it will be required that notation follows modern textbooks or that the authors justify any deviation from modern notation.

The two most important definitions of entropy are the thermodynamic entropy and the information theoretic entropy. They can be, and have been, generalized in various ways. Some of these generalized entropies have turned out to be useful, but most have found absolutely no applications. There have also been some submissions where the main point of the manuscript was that the authors were able to compute an entropy or some related quantity. Both for generalizations and calculations of entropies the authors should be able to justify why this is done. Some journals in pure mathematics may be interested in generalizations or calculations for their own sake, but such an approach will not support the kind of interdisciplinary approach that a journal like *Entropy* wants to promote.

Some Words on Units

Physicists have developed a good way of handling units. In physics one may say that a length ℓ is 4.13 feet that equals 1.25 meters, or equivalently in symbolic form $\ell = 4.13$ ft $= 1.25$ m. The SI unit for thermodynamic entropy is Joule per Kelvin or J/K but obviously it is easy to convert into other units. In information theory this good habit is not so widely used and sometimes this creates confusion when one works on the interplay between information theory and other fields. The most used unit for information is the bit. It is the maximal amount of information carried by one binary symbol. An alternative unit is hartley that is the maximal information in one digit. So we easily get the conversion 1 Hart equals 3.3219 bits. An alternative basic unit is 1 nat that equals 1.4427 bits. If one uses Shannon's formula for calculating the entropy of a probability distribution then one has to chose the base of the logarithm. If base 2 is used one get the information measured in bits, if base 10 is used one get the information measured in hartleys and if base e is used one get the information measured in nats. This is well-known. Nevertheless there is a bad tradition of first choosing the base of the logarithm and then to indicate the amount of information without units. This bad habit makes conversion between different information theoretical units difficult and relating them to units of physics even harder. Therefore we need always to use units when we measure information.

These comments may seem trivial when we want to calculate the Shannon or Rényi entropy but already for Tsallis entropy it is not clear what the unit is. In quantum information theory there are also several units like qubit and ebit floating around but I think that a more consistent use of these units are needed. We know that one can encode the information of a bit into a qubit, but does this allows us to write 1 bit $<$ 1 qubit? There are many obvious questions of this kind that have not been solved, and without a well-defined system of units it is difficult to translate results between disciplines. A journal does not develop new results but it can promote a common language to understand these results.

A New Optional Submission Method

Currently manuscripts are submitted to the Editorial Office by e-mail, before an Assistant Editor distributes the manuscript to peer-reviewers and editors. After discussion with the Publisher, we have decided to support an additional submission method, which is already used by some other journals.

Authors will be allowed to upload their manuscript to arXiv (http://www.arxiv.org/), and to submit the manuscript by sending the link (URL) of the preprint to the Editorial Office. This method still involves e-mailing, but will ensure that all involved parties will always communicate about the same version of a manuscript.