



SDI Review Form 1.6

Journal Name:	Current Journal of Applied Science and Technology
Manuscript Number:	Ms_CJAST_38488
Title of the Manuscript:	Validation of the Area1 of Approximate Entropy (a1ApEn) in Empirical Data of Heart Rate
Type of the Article	Original Research Article

General guideline for Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty**', provided the manuscript is scientifically robust and technically sound. To know the complete guideline for Peer Review process, reviewers are requested to visit this link:

(<http://www.sciencedomain.org/page.php?id=sdi-general-editorial-policy#Peer-Review-Guideline>)



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PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Compulsory REVISION comments		
Minor REVISION comments	This manuscript applies the time-series complexity measure, called “Area1 of Approximate Entropy” (a1ApEn), in some empirical data concerning heart rate. It is showed that the a1ApEn estimator, like the HRV\C estimators, is intrinsically correlated to heart rate. Moreover, a1ApEn is more sensitive to temporal organization (of several prototypical processes) than the Root Mean Square of the Difference between adjacent R-R intervals (RMSSD) estimator. The author(s) demonstrated that the a1ApEn measure adequately estimates the complexity of heart rate and adds more information than the usual HRV estimators and, therefore, they propose that the a1ApEn is a valid tool to study real time series. General comments about the mathematical formulations: (a) When you use MS Word and not LaTeX editing software (provided that the journal has its own LaTeX template), it is suggested to use a mathematical formula editing tool like MathType, and not the MS Word's own equation editor (which is limited and problematic). (b) All the mathematical variables/functions/notations/symbols should be written using the available editing tool and not in plain paragraph font. For example, you can write “Letters <i>a,b,c</i> denote variables” instead of “Letters a,b,c denote variables”. In particular, • All the mathematical variables or user-defined functions should be in italics (or in “math style” in MathType), for example <i>X, x, f(x), i, j, t</i>, etc. instead of <i>X, x, f(x), i, j, t</i>, respectively, while known mathematical function should be in upright form (non-italics, or “function style” in MathType), like <i>sin x, log y, exp(x)</i>, etc. This also applies to the notation of the expected value and variance of a random variable, say <i>X</i>, i.e. you can write <i>EX</i> or <i>E(X)</i>, and <i>VarX</i> or <i>Var(X)</i> instead of <i>E(X)</i> and <i>Var(X)</i>. • Vectors and matrices, usually denoted with up-right letters like <i>v, A, M</i> or bold up-right letters like v, A, M. • When you use the differential operator, you can denote it with the up-right letter <i>d</i> (in order to be distinguished from variable <i>d</i>). For example, you can write <i>df/dx</i> and $\int_a^b f(x) dx$ instead of <i>df/dx</i> and $\int_a^b f(x)dx$ respectively. • Use up-right form when you write mathematical constants, i.e. you can write <i>e^x</i> or <i>2π</i> instead of <i>e^x</i> or <i>2π</i> respectively. • Finally, when you are referring to an equation number, please use the form e.g. “from eq. (2)” or “from eqs. (2) and (3)”. (c) When you use indexes that are textual (not variables) please use upright form not italics. For example, you can write <i>G_{total}</i> instead of <i>G_{total}</i>. (d) Please put a full stop at the end of an equation line if your sentence ends there, or put a comma if your sentence continues after the equation line.	(a) We use MathType. Comments (b), (c) and (d): revised in the text.



	Here are some minor revision comments: <i>Note:</i> The text in red below represents the suggested changes/additions. Page 1. Abstract's Results: Please rewrite as "All the HRC/V estimators, except nuLF and nuVHF, showed a decrease in low intensity exercise. For intra-population, all the estimators, except VHF, demonstrated highly significant negative correlations with heart rate. In the reconstituted rR-R series, both RMSSD and a1ApEn increased due to the phase shuffling, while the effect being more intense in a1ApEn." Lines 14-17: Please rewrite as "A huge number of so-called "entropies" or, in general, entropy measures, were devised during the last decades and applied throughout many fields of research, in the context of "complexity analysis". Approximate Entropy (ApEn) is one of such tools [1,2], i.e. an information entropy measure widely employed, probably due to its very simple computation." Lines 20-22: Please rewrite as "In order to circumvent such a problem, some researchers developed entropy measures derived from ApEn [3,5,6]. As we have recently shown, to numerically compute the area under the curve of 21 ApEn values obtained for window $m=1$ using all the range of tolerances r that covers the...". Please apply General Comment (a) throughout the manuscript. Page 2. Line 42: To be accordance to subsection 2.4, please use sub-subsection numbering and italics, i.e. you can rewrite as "2.1.1. <i>Subjects</i>. 25 healthy people..." Line 50: Please rewrite as "2.1.2. <i>Experimental Protocol</i>. An initial..." Line 72: Please rewrite as "...remaining series was still non-stationary, the subject was rejected from any further analysis." Line 75: Please rewrite as "The mean heart rate (f_c) of each". Please apply General Comment (a) throughout the manuscript. Page 3. Lines 81,83,86: Please rewrite, respectively, as "2.3.1. <i>Standard deviation of normal-to-normal R-R intervals (SDNN)</i>. The estimator...", "2.3.2. <i>Root Mean Square of the Difference between adjacent R-R intervals (RMSSD)</i>. This estimator..." and "2.3.3. <i>Frequency Bands</i>. The usual partitioning..." Line 103: Please put a full stop at the end of eq. (1). Please apply General Comment (d) throughout the manuscript. Lines 108-112: Please rewrite as " $ApEn(1, \mathbf{r}, N) = \phi^1(\mathbf{r}) - \phi^2(\mathbf{r}),$ where N is the size of the time-series ($N = 150$ for the analysis here, unless for the scaling profile, as described shortly), and ϕ^1 and ϕ^2 are countings for $m=1$ and 2, respectively, as defined in the ApEn procedure [18]. The last step is to compute the numeric integral of eq. (2) in...". Please apply General Comments (b) and (d) throughout the manuscript. Line 115: Please rewrite as "$a1ApEn(N) = \int_0^1 ApEn(1, \mathbf{r}^*, N) d\mathbf{r}.$". Please apply General Comments (b) and (d) throughout the manuscript. Lines 120-124: Please rewrite as "...sizes N_j where the subscript j indicates the length of a vector (e.g., $j =$	We changed the text accordingly to the suggestions / comments / corrections.
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	100, 200, 300, 400, 500). Then, a vector of size S is randomly sub-sampled in v vectors of size N_j ($S > N_j + 3v$ for every j), and v values of a1ApEn are thus computed. Let a_j be a set formed by the obtained a1ApEn values. For each set a_j, the indicators minimum, mean and maximum a1ApEn values are selected and the correlation between each one of them and the logarithm of the sizes N_j is computed.”. Page 4. Lines 144-145: Please rewrite as “NbRN: non-bounded random numbers (ndrn: normally distributed random numbers); BnRN: bounded random numbers...”. Please rewrite the table’s sub-notes (lines 144-148) in a smaller font size. Apply this rule, i.e. use a smaller font size for the notes written under a table, throughout the manuscript. Lines 159,162,165: Please rewrite the titles of the sub-subsections 2.6.1, 2.6.2 and 2.6.3 in italics (not underlined bold). See review comment in page 3. Page 5. Lines 177-178: Please rewrite as “Notice that, except for the VHF case, all paired comparisons...”. Page 6. Lines 184-186: Please use a smaller font size for the notes written under a table. See review comment in page 4. Apply this rule throughout the manuscript. Lines 192-193: Does the author(s) mean something like “The frequency bands (LF, HF and VLF which had a non-significant comparison, despite the above-mentioned behaviour) show a decrease...”? If yes, please rewrite accordingly, otherwise rephrase the text inside parentheses. Line 215. Put a full stop at the end of the table’s title. Apply this rule to all table titles throughout the manuscript. Page 7. Lines 256-257: Put a full stop at the end of the table’s title. Apply this rule to all table titles throughout the manuscript. Page 8. Lines 258-259: Please use a smaller font size for the notes written under a table. Apply this rule throughout the manuscript.	
<u>Optional/General</u> comments		

Rephrased.