A Dictionary of Plant Sciences by Michael Allaby and the graphical law

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Abstract

We study A Dictionary of Plant Sciences, the fourth edition, by Michael Allaby from the Oxford University Press. We draw the natural logarithm of the number of entries, normalised, starting with a letter vs the natural logarithm of the rank of the letter, normalised. We conclude that the Dictionary can be characterised by BP(4, $\beta H = 0.02$), i.e. the Bethe-Peierls curve in the presence of four nearest neighbours and little external magnetic field, $\beta H = 0.02$. β is $\frac{1}{k_B T}$ where, T is temperature and k_B is the tiny Boltzmann constant. This is the case with A Dictionary Of Psychology by A. M. Colman from the Oxford University Press we have studied before. It appears that the branch of Plant Sciences is tantalizingly closer to the branch of Psychology, internally.

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I. INTRODUCTION

Plants are all around allowing us to breathe. The botanical world is the example of the diversity. To look for integrity into that world is natural to pursue. A Dictionary of Plant Sciences, the fourth edition, by Michael Allaby from Oxford University Press, [1] is a readily available place to fathom in. We study magnetic field pattern behind the entries of this dictionary, [1], in this article. We have started considering magnetic field pattern in [2], in the languages we converse with. We have studied there, a set of natural languages, [2] and have found existence of a magnetisation curve under each language. We have termed this phenomenon as graphical law.

Then, we moved on to investigate into, [3], dictionaries of five disciplines of knowledge and found existence of a curve magnetisation under each discipline. This was followed by finding of the graphical law behind the bengali language,[4] and the basque language[5]. This was pursued by finding of the graphical law behind the Romanian language, [6], five more disciplines of knowledge, [7], Onsager core of Abor-Miri, Mising languages,[8], Onsager Core of Romanised Bengali language,[9], the graphical law behind the Little Oxford English Dictionary, [10], the Oxford Dictionary of Social Work and Social Care, [11], the Visayan-English Dictionary, [12], Garo to English School Dictionary, [13], Mursi-English-Amharic Dictionary, [14] and Names of Minor Planets, [15], A Dictionary of Tibetan and English, [16], Khasi English Dictionary, [17], Turkmen-English Dictionary, [18], Websters Universal Spanish-English Dictionary, [19], A Dictionary of Modern Italian, [20], Langenscheidt's German-English Dictionary, [21], Essential Dutch dictionary by G. Quist and D. Strik, [22], Swahili-English dictionary by C. W. Rechenbach, [23], Larousse Dictionnaire De Poche for the French, [24], the Onsager's solution behind the Arabic, [25], the graphical law behind Langenscheidt Taschenwörterbuch Deutsch-Englisch / Englisch-Deutsch, Völlige Neubearbeitung, [26], the graphical law behind the NTC's Hebrew and English Dictionary by Arie Comey and Naomi Tsur, [27], the graphical law behind the Oxford Dictionary Of Media and Communication, [28], the graphical law behind the Oxford Dictionary Of Mathematics, Penguin Dictionary Of Mathematics, [29], the Onsager's solution behind the Arabic Second part, [30], the graphical law behind the Penguin Dictionary Of Sociology, [31], behind the Concise Oxford Dictionary Of Politics, [32], a Dictionary Of Critical Theory by Ian Buchanan, [33], the Penguin Dictionary Of Economics, [34], the Concise Gojri-English Dic-

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tionary by Dr. Rafeeq Anjum, [35], A Dictionary of the Kachin Language by Rev.O.Hanson, [36], A Dictionary Of World History by Edmund Wright, [37], behind Ekagi-Dutch-English-Indonesian Dictionary by J. Steltenpool and the Onsager's solution, [38], respectively.

We describe how a graphical law is hidden within A Dictionary of Plant Sciences, the fourth edition, by Michael Allaby, [1], in this article. The planning of the paper is as follows. We give an introduction to the standard curves of magnetisation of Ising model in the section II. In the section III, we describe the analysis of A Dictionary of Plant Sciences, the fourth edition, by Michael Allaby, [1]. The section IV narrates the comparison with the Oxford Dictionary of Psychology, [39], we have studied in [7]. The section V is Acknowledgment. The last section is Bibliography.

II. MAGNETISATION

A. Bragg-Williams approximation

Let us consider a coin. Let us toss it many times. Probability of getting head or, tale is half i.e. we will get head and tale equal number of times. If we attach value one to head, minus one to tale, the average value we obtain, after many tossing is zero. Instead let us consider a one-sided loaded coin, say on the head side. The probability of getting head is more than one half, getting tale is less than one-half. Average value, in this case, after many tossing we obtain is non-zero, the precise number depends on the loading. The loaded coin is like ferromagnet, the unloaded coin is like para magnet, at zero external magnetic field. Average value we obtain is like magnetisation, loading is like coupling among the spins of the ferromagnetic units. Outcome of single coin toss is random, but average value we get after long sequence of tossing is fixed. This is long-range order. But if we take a small sequence of tossing, say, three consecutive tossing, the average value we obtain is not fixed, can be anything. There is no short-range order.

Let us consider a row of spins, one can imagine them as spears which can be vertically up or, down. Assume there is a long-range order with probability to get a spin up is two third. That would mean when we consider a long sequence of spins, two third of those are with spin up. Moreover, assign with each up spin a value one and a down spin a value minus

one. Then total spin we obtain is one third. This value is referred to as the value of long-range order parameter. Now consider a short-range order existing which is identical with the long-range order. That would mean if we pick up any three consecutive spins, two will be up, one down. Bragg-Williams approximation means short-range order is identical with long-range order, applied to a lattice of spins, in general. Row of spins is a lattice of one dimension.

Now let us imagine an arbitrary lattice, with each up spin assigned a value one and a down spin a value minus one, with an unspecified long-range order parameter defined as above by $L = \frac{1}{N}\Sigma_i\sigma_i$, where σ_i is i-th spin, N being total number of spins. L can vary from minus one to one. $N = N_+ + N_-$, where N_+ is the number of up spins, N_- is the number of down spins. $L = \frac{1}{N}(N_+ - N_-)$. As a result, $N_+ = \frac{N}{2}(1 + L)$ and $N_- = \frac{N}{2}(1 - L)$. Magnetisation or, net magnetic moment , M is $\mu\Sigma_i\sigma_i$ or, $\mu(N_+ - N_-)$ or, μNL, $M_{max} = \mu N$. $\frac{M}{M_{max}} = L$. $\frac{M}{M_{max}}$ is referred to as reduced magnetisation. Moreover, the Ising Hamiltonian,[40], for the lattice of spins, setting μ to one, is $-\epsilon\Sigma_{n.n}\sigma_i\sigma_j - H\Sigma_i\sigma_i$, where n.n refers to nearest neighbour pairs. The difference $\triangle E$ of energy if we flip an up spin to down spin is, [41], $2\epsilon\gamma\bar{\sigma} + 2H$, where γ is the number of nearest neighbours of a spin. According to Boltzmann principle, $\frac{N_-}{N_+}$ equals $exp(-\frac{\triangle E}{k_B T})$, [42]. In the Bragg-Williams approximation,[43], $\bar{\sigma} = L$, considered in the thermal average sense. Consequently,

$$ln\frac{1 + L}{1 - L} = 2\frac{\gamma\epsilon L + H}{k_B T} = 2\frac{L + \frac{H}{\gamma\epsilon}}{\frac{T}{\gamma\epsilon/k_B}} = 2\frac{L + c}{\frac{T}{T_c}} \tag{1}$$

where, $c = \frac{H}{\gamma\epsilon}$, $T_c = \gamma\epsilon/k_B$, [44]. $\frac{T}{T_c}$ is referred to as reduced temperature.

Plot of L vs $\frac{T}{T_c}$ or, reduced magentisation vs. reduced temperature is used as reference curve. In the presence of magnetic field, $c \neq 0$, the curve bulges outward. Bragg-Williams is a Mean Field approximation. This approximation holds when number of neighbours interacting with a site is very large, reducing the importance of local fluctuation or, local order, making the long-range order or, average degree of freedom as the only degree of freedom of the lattice. To have a feeling how this approximation leads to matching between experimental and Ising model prediction one can refer to FIG.12.12 of [41]. W. L. Bragg was a professor of Hans Bethe. Rudolf Peierls was a friend of Hans Bethe. At the suggestion of W. L. Bragg, Rudolf Peierls following Hans Bethe improved the approximation scheme, applying quasi-chemical method.
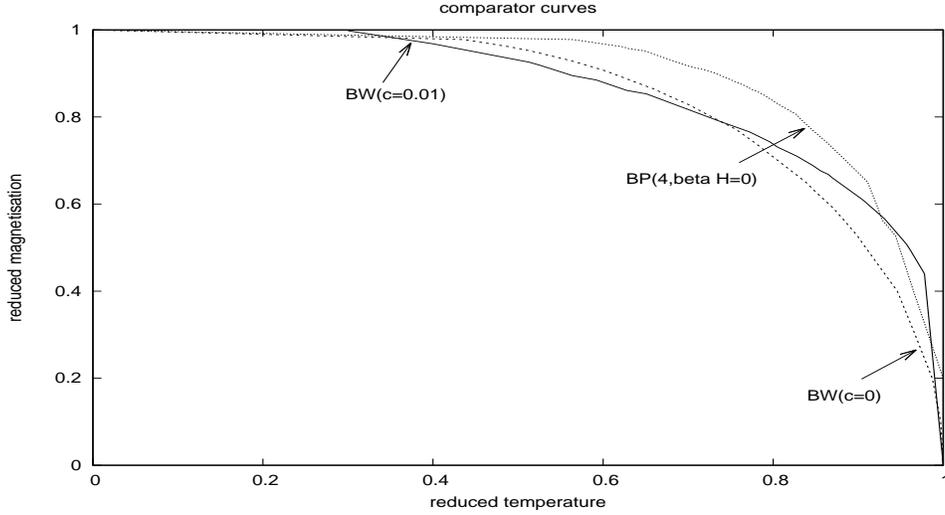
FIG. 1. Reduced magnetisation vs reduced temperature curves for Bragg-Williams approximation, in absence(dark) of and presence(inner in the top) of magnetic field, $c = \frac{H}{\gamma\epsilon} = 0.01$, and Bethe-Peierls approximation in absence of magnetic field, for four nearest neighbours (outer in the top).

B. Bethe-peierls approximation in presence of four nearest neighbours, in absence of external magnetic field

In the approximation scheme which is improvement over the Bragg-Williams, [40],[41],[42],[43],[44], due to Bethe-Peierls, [45], reduced magnetisation varies with reduced temperature, for γ neighbours, in absence of external magnetic field, as

$$\frac{ln\frac{\gamma}{\gamma-2}}{ln\frac{factor-1}{factor^{\frac{\gamma-1}{\gamma}}-factor^{\frac{1}{\gamma}}}} = \frac{T}{T_c}; factor = \frac{\frac{M}{M_{max}}+1}{1-\frac{M}{M_{max}}}. \tag{2}$$

$ln\frac{\gamma}{\gamma-2}$ for four nearest neighbours i.e. for $\gamma = 4$ is 0.693. For a snapshot of different kind of magnetisation curves for magnetic materials the reader is urged to give a google search "reduced magnetisation vs reduced temperature curve". In the following, we describe data s generated from the equation(1) and the equation(2) in the table, I, and curves of magnetisation plotted on the basis of those data s. BW stands for reduced temperature in Bragg-Williams approximation, calculated from the equation(1). BP(4) represents reduced temperature in the Bethe-Peierls approximation, for four nearest neighbours, computed from the equation(2). The data set is used to plot fig.1. Empty spaces in the table, I, mean corresponding point pairs were not used for plotting a line.

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BW	BW(c=0.01)	BP(4,$\beta H = 0$)	reduced magnetisation
0	0	0	1
0.435	0.439	0.563	0.978
0.439	0.443	0.568	0.977
0.491	0.495	0.624	0.961
0.501	0.507	0.630	0.957
0.514	0.519	0.648	0.952
0.559	0.566	0.654	0.931
0.566	0.573	0.7	0.927
0.584	0.590	0.7	0.917
0.601	0.607	0.722	0.907
0.607	0.613	0.729	0.903
0.653	0.661	0.770	0.869
0.659	0.668	0.773	0.865
0.669	0.676	0.784	0.856
0.679	0.688	0.792	0.847
0.701	0.710	0.807	0.828
0.723	0.731	0.828	0.805
0.732	0.743	0.832	0.796
0.756	0.766	0.845	0.772
0.779	0.788	0.864	0.740
0.838	0.853	0.911	0.651
0.850	0.861	0.911	0.628
0.870	0.885	0.923	0.592
0.883	0.895	0.928	0.564
0.899	0.918		0.527
0.904	0.926	0.941	0.513
0.946	0.968	0.965	0.400
0.967	0.998	0.965	0.300
0.987		1	0.200
0.997		1	0.100
1	1	1	0

TABLE I. Reduced magnetisation vs reduced temperature data s for Bragg-Williams approximation, in absence of and in presence of magnetic field, $c = \frac{H}{\gamma \epsilon} = 0.01$, and Bethe-Peierls approximation in absence of magnetic field, for four nearest neighbours.

C. Bethe-peierls approximation in presence of four nearest neighbours, in presence of external magnetic field

In the Bethe-Peierls approximation scheme , [45], reduced magnetisation varies with reduced temperature, for γ neighbours, in presence of external magnetic field, as

$$\frac{ln\frac{\gamma}{\gamma-2}}{ln\frac{factor-1}{e^{\frac{2\beta H}{\gamma}}factor^{\frac{\gamma-1}{\gamma}}-e^{-\frac{2\beta H}{\gamma}}factor^{\frac{1}{\gamma}}}} = \frac{T}{T_c}; factor = \frac{\frac{M}{M_{max}}+1}{1-\frac{M}{M_{max}}}. \tag{3}$$

Derivation of this formula Ala [45] is given in the appendix of [7].

$ln\frac{\gamma}{\gamma-2}$ for four nearest neighbours i.e. for $\gamma = 4$ is 0.693. For four neighbours,

$$\frac{0.693}{ln\frac{factor-1}{e^{\frac{2\beta H}{\gamma}}factor^{\frac{\gamma-1}{\gamma}}-e^{-\frac{2\beta H}{\gamma}}factor^{\frac{1}{\gamma}}}} = \frac{T}{T_c}; factor = \frac{\frac{M}{M_{max}}+1}{1-\frac{M}{M_{max}}}. \tag{4}$$
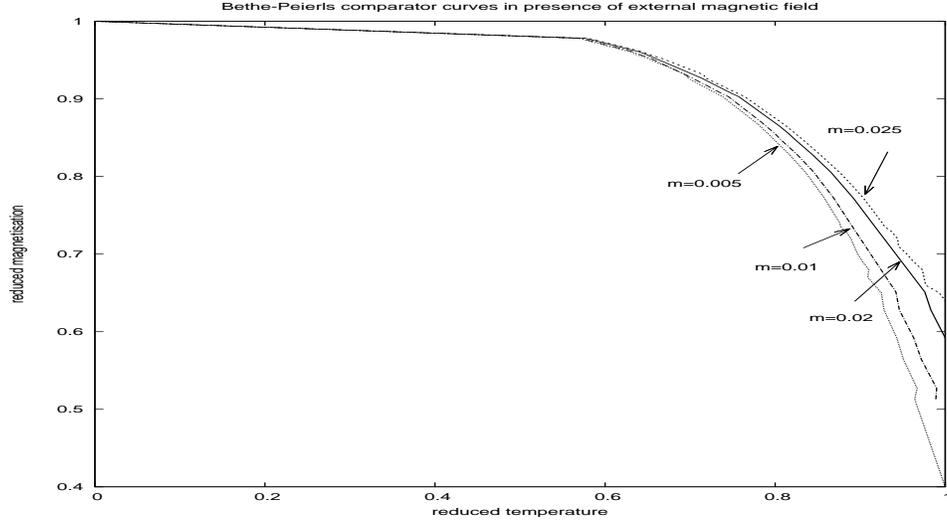
FIG. 2. Reduced magnetisation vs reduced temperature curves for Bethe-Peierls approximation in presence of little external magnetic fields, for four nearest neighbours, with $\beta H = 2m$.

In the following, we describe data s in the table, II, generated from the equation(4) and curves of magnetisation plotted on the basis of those data s. BP(m=0.03) stands for reduced temperature in Bethe-Peierls approximation, for four nearest neighbours, in presence of a variable external magnetic field, H, such that $\beta H = 0.06$. calculated from the equation(4). BP(m=0.025) stands for reduced temperature in Bethe-Peierls approximation, for four nearest neighbours, in presence of a variable external magnetic field, H, such that $\beta H = 0.05$. calculated from the equation(4). BP(m=0.02) stands for reduced temperature in Bethe-Peierls approximation, for four nearest neighbours, in presence of a variable external magnetic field, H, such that $\beta H = 0.04$. calculated from the equation(4). BP(m=0.01) stands for reduced temperature in Bethe-Peierls approximation, for four nearest neighbours, in presence of a variable external magnetic field, H, such that $\beta H = 0.02$. calculated from the equation(4). BP(m=0.005) stands for reduced temperature in Bethe-Peierls approximation, for four nearest neighbours, in presence of a variable external magnetic field, H, such that $\beta H = 0.01$. calculated from the equation(4). The data set is used to plot fig.2. Similarly, we plot fig.3. Empty spaces in the table, II, mean corresponding point pairs were not used for plotting a line.

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BP(m=0.03)	BP(m=0.025)	BP(m=0.02)	BP(m=0.01)	BP(m=0.005)	reduced magnetisation
0	0	0	0	0	1
0.583	0.580	0.577	0.572	0.569	0.978
0.587	0.584	0.581	0.575	0.572	0.977
0.647	0.643	0.639	0.632	0.628	0.961
0.657	0.653	0.649	0.641	0.637	0.957
0.671	0.667		0.654	0.650	0.952
	0.716			0.696	0.931
0.723	0.718	0.713	0.702	0.697	0.927
0.743	0.737	0.731	0.720	0.714	0.917
0.762	0.756	0.749	0.737	0.731	0.907
0.770	0.764	0.757	0.745	0.738	0.903
0.816	0.808	0.800	0.785	0.778	0.869
0.821	0.813	0.805	0.789	0.782	0.865
0.832	0.823	0.815	0.799	0.791	0.856
0.841	0.833	0.824	0.807	0.799	0.847
0.863	0.853	0.844	0.826	0.817	0.828
0.887	0.876	0.866	0.846	0.836	0.805
0.895	0.884	0.873	0.852	0.842	0.796
0.916	0.904	0.892	0.869	0.858	0.772
0.940	0.926	0.914	0.888	0.876	0.740
	0.929			0.877	0.735
	0.936			0.883	0.730
	0.944			0.889	0.720
	0.945				0.710
	0.955			0.897	0.700
	0.963			0.903	0.690
	0.973			0.910	0.680
				0.909	0.670
	0.993			0.925	0.650
		0.976	0.942		0.651
	1.00				0.640
		0.983	0.946	0.928	0.628
		1.00	0.963	0.943	0.592
			0.972	0.951	0.564
			0.990	0.967	0.527
				0.964	0.513
			1.00		0.500
				1.00	0.400
					0.300
					0.200
					0.100
					0

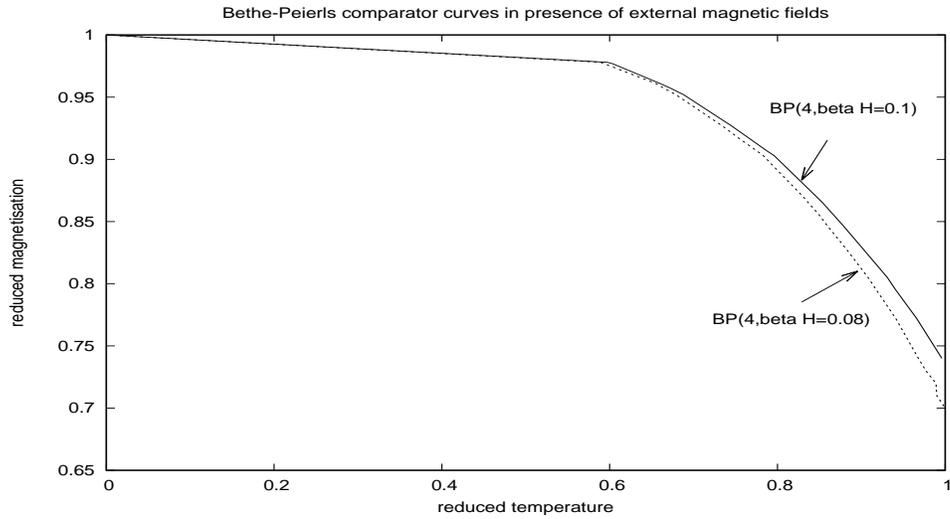TABLE II. Bethe-Peierls approx. in presence of little external magnetic fields

FIG. 3. Reduced magnetisation vs reduced temperature curves for Bethe-Peierls approximation in presence of little external magnetic fields, for four nearest neighbours, with $\beta H = 2m$.

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A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
676	411	880	340	391	234	322	342	175	28	49	307	504	209	164	923	23	297	720	345	60	117	70	26	9	38

TABLE III. Entries of a Dictionary of Plant Sciences
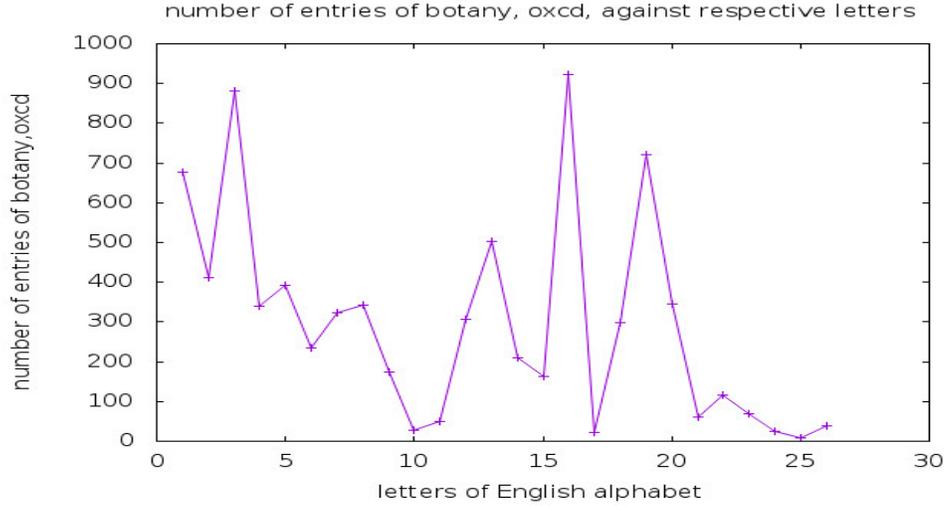
FIG. 4. The vertical axis is number of entries in a Dictionary of Plant Sciences,[1]. The horizontal axis is the letters of the English alphabet. Letters are represented by the sequence number in the alphabet.

III.   ANALYSIS OF A DICTIONARY OF PLANT SCIENCES ENTRIES

In A Dictionary of Plant Sciences, fourth edition, by Michael Allaby from Oxford University Press, [1], we have counted the entries, strictly speaking head entries, one by one from the beginning to the end, starting with different letters. The result is the table, III. Highest number of entries, nine hundred twenty three, start with the letter P followed by entries numbering eight hundred eighty beginning with C, seven hundred twenty with the letter S etc. To visualise we plot the number of entries again respective letters in the dictionary sequence,[1] in the adjoining figure, fig.4. For the purpose of exploring graphical law, we assort the letters according to the number of entries, in the descending order, denoted by f and the respective rank, [46], denoted by k. k is a positive integer starting from one. Moreover, we attach a limiting rank, k_{lim}, and a limiting number of entries. The limiting rank is maximum rank plus one, here it is twenty seven and the limiting number of entries is one. As a result both $\frac{lnf}{lnf_{max}}$ and $\frac{lnk}{lnk_{lim}}$ varies from zero to one. Then we tabulate in the

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k	lnk	lnk/lnk_{lim}	f	lnf	lnf/lnf_{max}	lnf/lnf_{nmax}	lnf/lnf_{2nmax}	lnf/lnf_{3nmax}	lnf/lnf_{4nmax}	lnf/lnf_{5nmax}
1	0	0	923	6.828	1	Blank	Blank	Blank	Blank	Blank
2	0.69	0.209	880	6.780	0.993	1	Blank	Blank	Blank	Blank
3	1.10	0.333	720	6.579	0.964	0.970	1	Blank	Blank	Blank
4	1.39	0.421	676	6.516	0.954	0.961	0.990	1	Blank	Blank
5	1.61	0.488	504	6.223	0.911	0.918	0.946	0.955	1	Blank
6	1.79	0.542	411	6.019	0.882	0.888	0.915	0.924	0.967	1
7	1.95	0.591	391	5.969	0.874	0.880	0.907	0.916	0.959	0.992
8	2.08	0.630	345	5.844	0.856	0.862	0.888	0.897	0.939	0.971
9	2.20	0.667	342	5.835	0.855	0.861	0.887	0.895	0.938	0.969
10	2.30	0.697	340	5.829	0.854	0.860	0.886	0.895	0.937	0.968
11	2.40	0.727	322	5.775	0.846	0.852	0.878	0.886	0.928	0.959
12	2.48	0.752	307	5.727	0.839	0.845	0.870	0.879	0.920	0.951
13	2.56	0.776	297	5.694	0.834	0.840	0.865	0.874	0.915	0.946
14	2.64	0.800	234	5.455	0.799	0.805	0.829	0.837	0.877	0.906
15	2.71	0.821	209	5.342	0.782	0.788	0.812	0.820	0.858	0.888
16	2.77	0.839	175	5.165	0.756	0.762	0.785	0.793	0.830	0.858
17	2.83	0.858	164	5.100	0.747	0.752	0.775	0.783	0.820	0.847
18	2.89	0.876	117	4.762	0.697	0.702	0.724	0.731	0.765	0.791
19	2.94	0.891	70	4.248	0.622	0.627	0.646	0.652	0.683	0.706
20	3.00	0.909	60	4.094	0.600	0.604	0.622	0.628	0.658	0.680
21	3.04	0.921	49	3.892	0.570	0.574	0.592	0.597	0.625	0.647
22	3.09	0.936	38	3.638	0.533	0.537	0.553	0.558	0.585	0.604
23	3.14	0.952	28	3.332	0.488	0.491	0.506	0.511	0.535	0.554
24	3.18	0.964	26	3.258	0.477	0.481	0.495	0.500	0.524	0.541
25	3.22	0.976	23	3.135	0.459	0.462	0.477	0.481	0.504	0.521
26	3.26	0.988	9	2.197	0.322	0.324	0.334	0.337	0.353	0.365
27	3.30	1	1	0	0	0	0	0	0	0

TABLE IV. A Dictionary of Plant Sciences entries: ranking,natural logarithm,normalisations

adjoining table,IV, and plot $\frac{lnf}{lnf_{max}}$ against $\frac{lnk}{lnk_{lim}}$ in the figure fig.5. We then ignore the letter with the highest of entries, tabulate in the adjoining table,IV,and redo the plot, normalising the lnfs with next-to-maximum $lnf_{next-max}$, and starting from $k = 2$ in the figure fig.6. Normalising the lnfs with next-to-next-to-maximum $lnf_{nextnext-max}$, we tabulate in the adjoining table,IV, and starting from $k = 3$ we draw in the figure fig.7. Normalising the lnfs with next-to-next-to-next-to-maximum $lnf_{nextnextnext-max}$ we record in the adjoining table,IV, and plot starting from $k = 4$ in the figure fig.8.
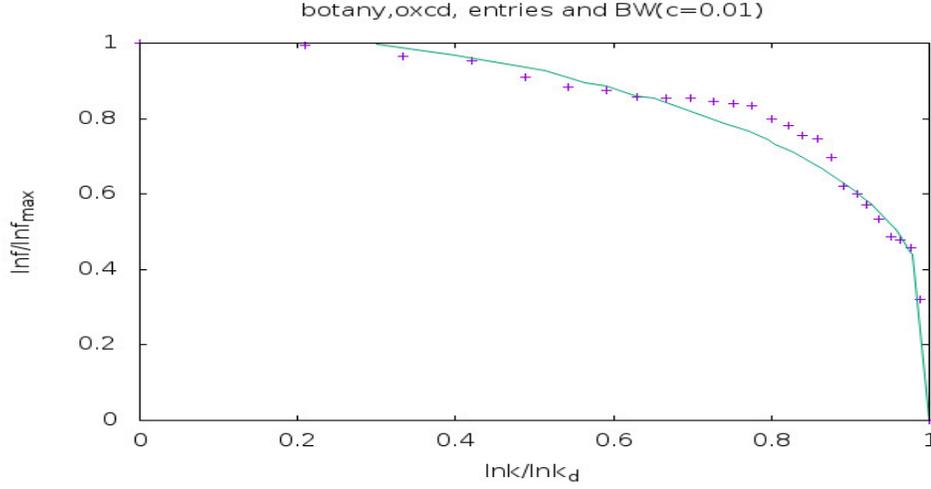
FIG. 5. The vertical axis is $\frac{lnf}{lnf_{max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the entries of A Dictionary of Plant Sciences with the fit curve being the Bragg-Williams curve in the presence of external magnetic field, $c = \frac{H}{\gamma\epsilon} = 0.01$.
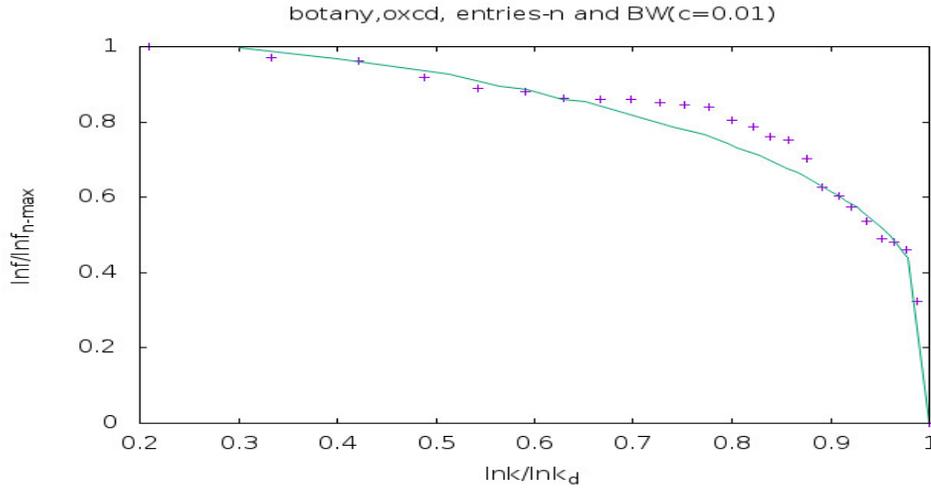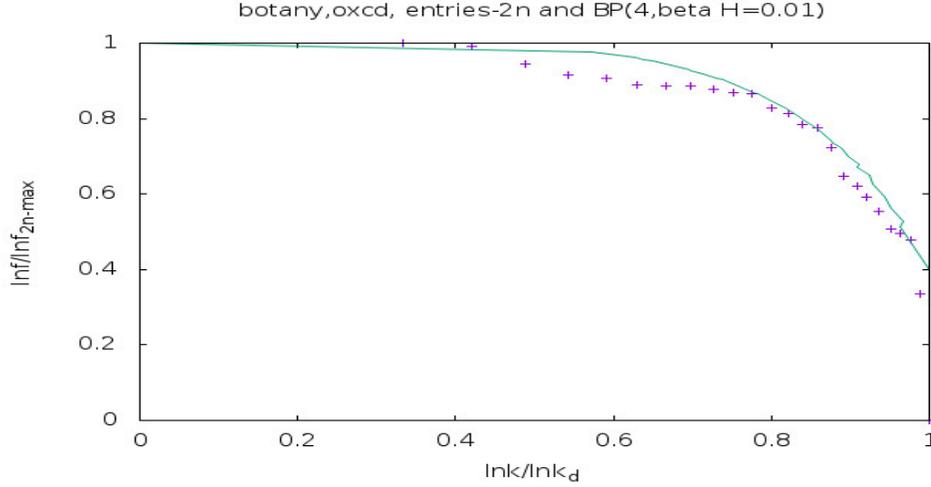

FIG. 6. The vertical axis is $\frac{lnf}{lnf_{next-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the entries of A Dictionary of Plant Sciences with the fit curve being the Bragg-Williams curve in the presence of external magnetic field, $c = \frac{H}{\gamma\epsilon} = 0.01$.

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FIG. 7. The vertical axis is $\frac{lnf}{lnf_{nextnext-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the entries of A Dictionary of Plant Sciences with the fit curve being the Bethe-Peierls curve in presence of four nearest neighbours and little external magnetic field, $m = 0.005$ or,$\beta H = 0.01$.
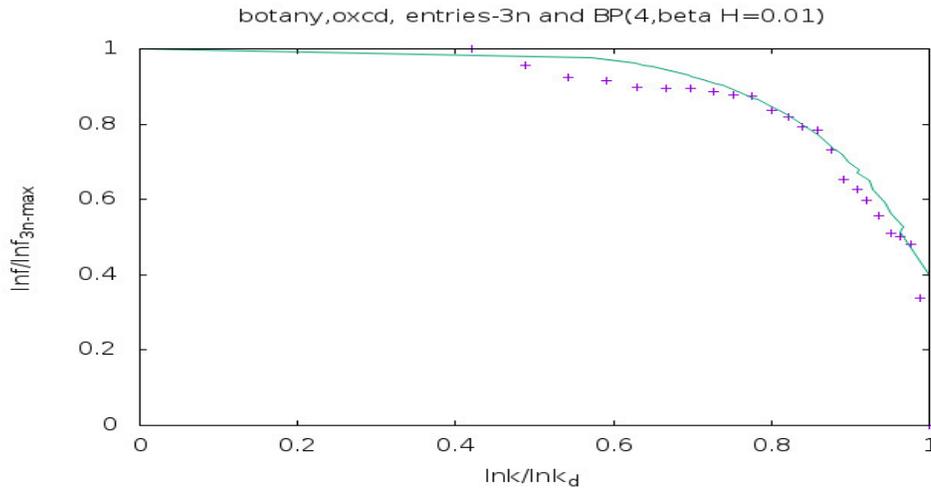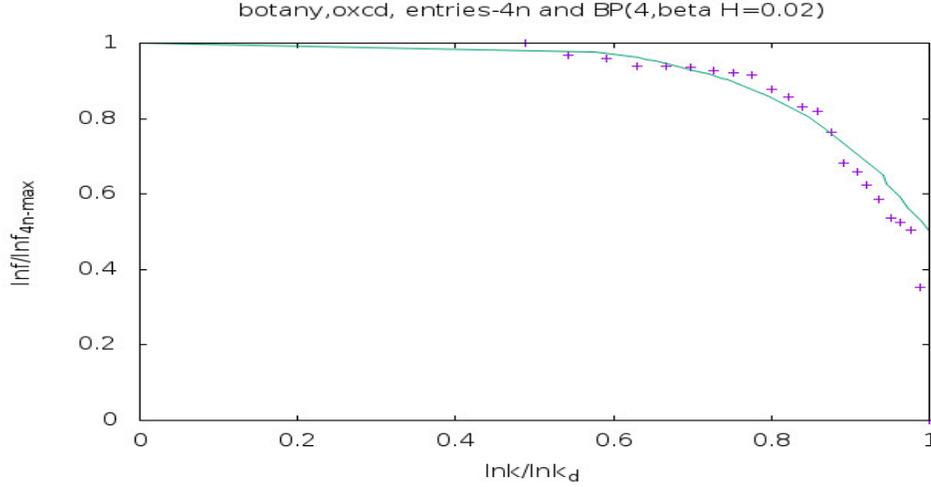

FIG. 8. The vertical axis is $\frac{lnf}{lnf_{nextnextnext-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the entries of A Dictionary of Plant Sciences with the fit curve being the Bethe-Peierls curve in presence of four nearest neighbours and little external magnetic field, $m = 0.005$ or,$\beta H = 0.01$.

FIG. 9. The vertical axis is $\frac{lnf}{lnf_{nextnextnextnext-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the entries of A Dictionary of Plant Sciences with the fit curve being the Bethe-Peierls curve in presence of four nearest neighbours and little external magnetic field, $m = 0.01$ or,$\beta H = 0.02$.
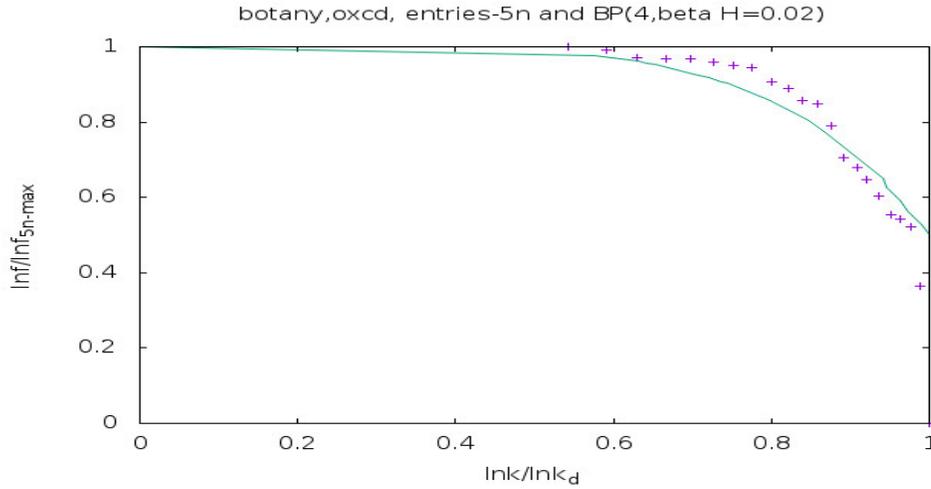

FIG. 10. The vertical axis is $\frac{lnf}{lnf_{nextnextnextnextnext-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the entries of A Dictionary of Plant Sciences with the fit curve being the Bethe-Peierls curve in presence of four nearest neighbours and little external magnetic field, $m = 0.01$ or,$\beta H = 0.02$.

A. conclusion

From the figures (fig.5-fig.10), we observe that there is a curve of magnetisation, behind the entries of plant sciences,[1]. This is the magnetisation curve in the Bethe-Peierls approximation in the presence of four nearest neighbours and little external magnetic field $\beta H = 0.02$.

Moreover, the associated correspondence is,

$$\frac{\ln f}{\ln f_{4n-max}} \longleftrightarrow \frac{M}{M_{max}},$$

$$\ln k \longleftrightarrow T.$$

k corresponds to temperature in an exponential scale, [47]. As temperature decreases, i.e. $\ln k$ decreases, f increases. The letters which are recording higher entries .., S, C, P which get enriched more and more, fall at lower and lower temperatures. This is a manifestation of cooling effect, as was first observed in [48], in another way.

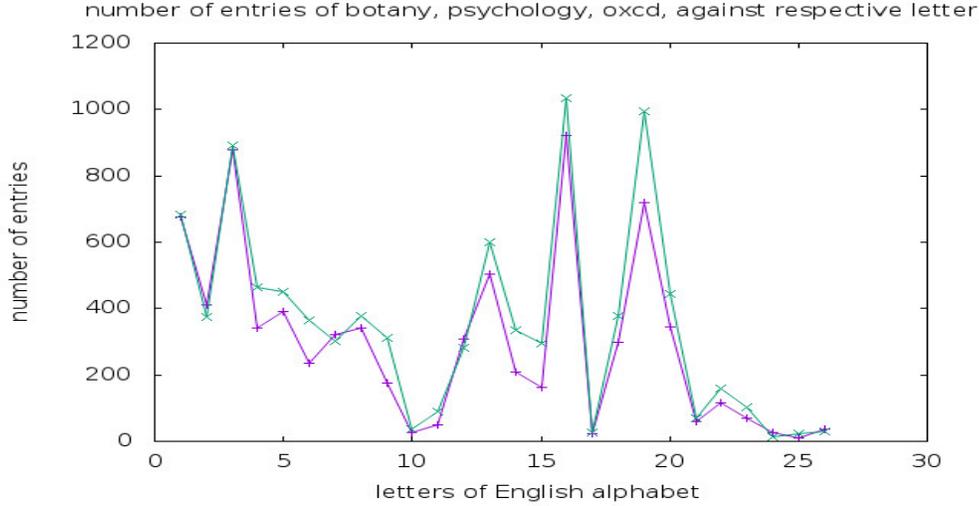number of entries of botany, psychology, oxcd, against respective letter

FIG. 11. The vertical axis is the number of entries. The upper line is that of the Oxford dictionary of Psychology,[39], and the lower line is that of A Dictionary of Plant Sciences,[1]. The horizontal axis is the respective letters. Letters are represented by the sequence number in the English alphabet. The highest maximum is coinciding at the letter P. Barring few places the two curves are almost falling on each other.

IV.   COMPARISON WITH A DICTIONARY OF PSYCHOLOGY

In the paper, [7], we have studied A Dictionary Of Psychology, [39], We have concluded that the dictionary is characterised by the magnetisation curve, BP(4, $\beta H = 0.02$). This is the same for this dictionary, a Dictionary of Plant Sciences,[1]. To see whether the frequency plots for a Dictionary of Psychology,[39] and Dictionary of Plant Sciences,[1], have any similarity we plot those in the figures fig.11. It appears from the figure fig.11, that these two are close, internally, to each other, with the letters P in a Dictionary of Psychology, [39], coinciding with the letters P in a Dictionary of Plant Sciences, [1], in the maximum. This indicates to us that Psychology and the Plant Sciences, as looked through Oxford Dictionaries, are tantalizingly close to each other internally.

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