A Dictionary of Modern Italian, the Graphical Law and Dictionary of Law and Administration, 2000, National Law Development Foundation

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Abstract

We study A Dictionary of Modern Italian by John Purves. 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(unnormalised). We conclude that the Dictionary can be characterised by BP(4,βH=0) i.e. a magnetisation curve for the Bethe-Peierls approximation of the Ising model with four nearest neighbours in absence of external magnetic field. H is external magnetic field, β is $\frac{1}{k_B T}$ where, T is temperature and k_B is the Boltzmann constant. Moreover, we compare the Italian language with other Romance languages. These are the Spanish, the Basque and the Romanian languages respectively. On the top of it, we compare A Dictionary of Modern Italian with Dictionary of Law and Administration, 2000, by National Law Development Foundation. We find a tantalizing similarity between the Modern Italian and the jargon of law and administartion.

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I. INTRODUCTION

As one hears "Prego?", "pasta with cheese or, tomato sauce?", one gets up from slumber and is certain he is in Italy. Italy is a country in the south of Europe, right in the Mediterranean sea. It stretches from the Greece to the Sicily. Rome, Venice, Trieste are among the places to go. Galileo Galilee to Fibonacci to Todaro Gini to Veneziano it has to offer to the world among many. Vibrant lifestyles it carries along with it. It is the winner of the Euro, this year. The Italians are the people. The Italian is the language. The Italian language, in narrower sense, A Dictionary of Modern Italian, [1], by John Purves is the subject of study of this paper.

Once the author got a colleague with the surname Barve, hailing from a konkonastha family of Pune, India. Since then he was wondering where from the surname Barve might have originated. Various deformations did not lead to a satisfactory explanation, until he he has gotten the dictionary, A Dictionary of Modern Italian, [1], in a second-hand book stall in the College Street, Kolkata. The author of the dictionary comes with the surname Purves. Immediately he could put the words Barve and Purves in a plausible environment. Studying the dictionary, putting the words in the graphical law analysis is the subject of this paper. To introduce the dictionary, [1], we reproduce few entries from the dictionary, [1], in the following.

Àncora in the Italian means anchor, ancóra means still, ànfora means jar or, water-jar, anšare means to breath heavily, Antille means the West Indies, arància means orange, aràre means to plough, argentiĕra means silver-mine, armèno means Armenia, àrte means skill, àva means grand-mother, avàna means havana, avànti means before, bàbbo means father, bacchillóne means good for nothing, bàia means joke, bànco means bench, battúta means beating, clapping, stamping etc, baúle means box, bàva means foam, bèlla means lover, biànco means white, biga(pl. bighe) means chariot, bis means twice, bisàvo means great-grand-mother, bócca means mouth, bòra means north-east wind, bòsco means forest, bràndo means (poet.) sword, búca(pl. búche) or, búco(pl. búchi) means hole, bústa means envelope, calia means gold dust, canònico means correct or, regular, càsa means house, Chimica means chemistry, chinar means bent, chitàrra means guitar, ciàlda means sweet wafer, còlle means hill, Enrico means Henry, fàlce means sickle, fàrsi means to grow, fermàta means stop, frutti means fruit, gerènte means manager, Giovànni means John, gita means trip, imo means the humblest person, ira means anger, làri means household gods, lima means file, limàre means to polish, luògo means place, mài means ever, malia means charm, màno(pl. màni) means hand, màssimo means greatest, matita means pencil, màzzo means bunch, méla means apple, mélo means apple-tree, moina means simper, mòrto means dead, Neerlàndia (which appears to the author like Nalanda) means the Netherlands, néro means black, nino means dear, ánda means wave, Pàolo means Paul, paràta means parade, pèlle means skin, pélo means hair, pèzzo means piece, piú means more, ràdica means root, rai means eyes, ràma means branch, rarità means rarity, règgia(pl. règge) means (royal) palace,riccio(pl. ricci) means hedgehog, ricòrodo means remembrance, rogo(pl. righi) means watercourse, rima means rhyme, risi means rice, ròcco means (chess) castle, r[u]òta means wheel, sàla means hall, Santippe means Xantippe(wife of Socrates) or, scold, sàno means sound, sàlve means hail, salita means ascent, sanità means soundness(of body or, soul), sassóne means large stone, sciacàllo means jackal, scita means Scythian, séta means silk, settèmbre means September, sóle means sun, sòsta means halt, sud means south, sudàta means sweat, súddito means subject, susina means plum, súvvi means up there, tèsta means head, triste means sad, tu means you, Únni means Huns, védova means widow, Venézia means Venice, Veneziano means resident of Venice, viavài means going and coming, Zàna means basket and so on.

In this article, we study magnetic field pattern behind this dictionary of the Italian,[1]. 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] respectively.

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 analysis of the entries of the Italian language, [1]. The section IV is comparisons with other Romance languages. In the section V, we bring forth the similarity of the Italian and the jargon of law and administration, [20]. Sections VI and VII are Acknowledgment and Bibliography respectively.

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,[21], 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, [22], $2\epsilon\gamma\bar{\sigma} + 2H$, where γ is the number of nearest neighbours of a spin. According to Boltzmann principle, $\frac{N_-}{N_+}$ equals $exp(-\frac{\triangle E}{k_B T})$, [23]. In the Bragg-Williams approximation,[24], $\bar{\sigma} = L$, 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, $c = \frac{H}{\gamma\epsilon}$, $T_c = \gamma\epsilon/k_B$, [25]. $\frac{T}{T_c}$ 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 [22]. 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.

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, [21],[22],[23],[24],[25], due to Bethe-Peierls, [26], reduced magnetisation varies with reduced temperature, for γ neighbours, in absence of external magnetic field, as

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

$ln\frac{\gamma}{\gamma-2}$ 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 datas generated from the equation(1) and the equation(2) in the table, I, and curves of magnetisation plotted on the basis of those datas. 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.

reduced temperature, $\frac{T}{T_c}$				$\frac{M}{M_{max}}$,
BW(c=0)	BW(c=0.005)	BW(c=0.01)	BP(4,βH = 0)	reduced magnetisation
0	0	0	0	1
0.435	0.437	0.439	0.563	0.978
0.439	0.441	0.443	0.568	0.977
0.491	0.493	0.495	0.624	0.961
0.501	0.504	0.507	0.630	0.957
0.514	0.517	0.519	0.648	0.952
0.559	0.562	0.565	0.654	0.931
0.566	0.569	0.573	0.7	0.927
0.584	0.587	0.590	0.7	0.917
0.601	0.604	0.607	0.722	0.907
0.607	0.610	0.613	0.729	0.903
0.653	0.658	0.661	0.770	0.869
0.659	0.663	0.666	0.773	0.865
0.669	0.674	0.678	0.784	0.856
0.679	0.684	0.688	0.792	0.847
0.701	0.705	0.709	0.807	0.828
0.723	0.728	0.732	0.828	0.805
0.732	0.736	0.743	0.832	0.796
0.753	0.758	0.766	0.845	0.772
0.779	0.784	0.788	0.864	0.740
0.838	0.844	0.853	0.911	0.651
0.850	0.858	0.864	0.911	0.628
0.870	0.877	0.885	0.923	0.592
0.883	0.891	0.899	0.928	0.564
0.899	0.908	0.918		0.527
0.905	0.914	0.926	0.941	0.513
0.944	0.956	0.968	0.965	0.400
		0.985		0.350
		0.998		0.310
0.969	0.985		0.965	0.300
	0.998			0.250
0.987			1	0.200
0.997			1	0.100
1			1	0

TABLE I. Datas for Reduced temperature[for the Bragg-Williams approximation, in the absence (BW(c=0)) and in the presence (BW(c=0.005), BW(c=0.01)) of magnetic field, $c = 0$, $c = \frac{H}{\gamma\epsilon} = 0.005$, $c = \frac{H}{\gamma\epsilon} = 0.01$ respectively and in the Bethe-Peierls approximation, BP(4,βH=0), in the absence of magnetic field, for four nearest neighbours] vs reduced magnetisation. Reduced temperature is drawn along the x-axis and Reduced magnetisation is drawn along the y-axis. In gnuplot the command is plot ".dat" using 1:2 with line; 1 standing for x-axis and 2 standing for y-axis datas.

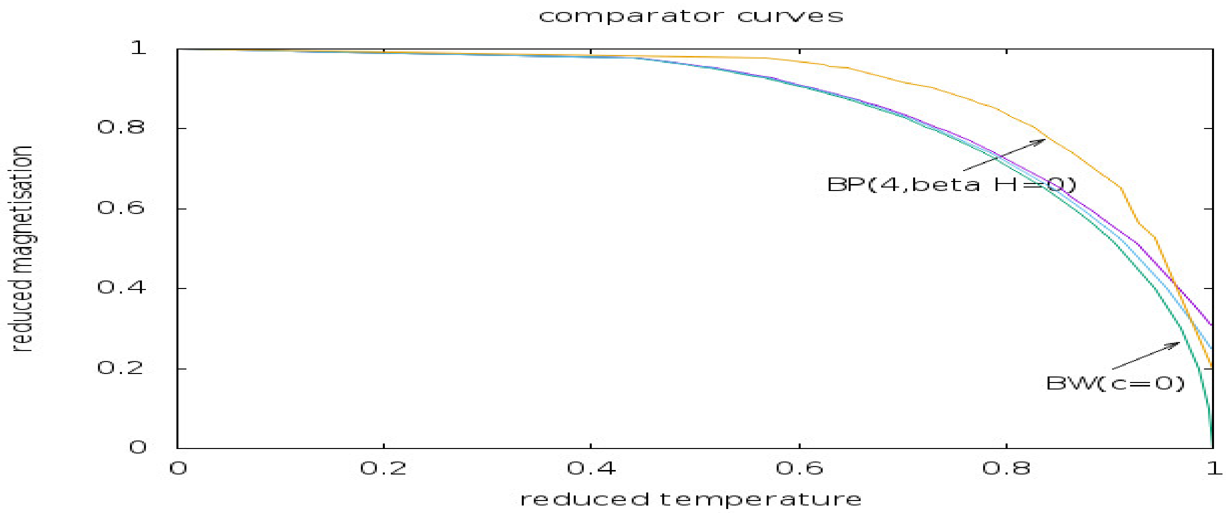

FIG. 1. Reduced magnetisation vs reduced temperature curves, for the Bragg-Williams approximation, in the absence (BW(c=0)) and in the presence (BW(c=0.005), BW(c=0.01)) of magnetic field, $c = 0$, $c = \frac{H}{\gamma\epsilon} = 0.005$, $c = \frac{H}{\gamma\epsilon} = 0.01$, outwards; and in the Bethe-Peierls approximation, BP(4,βH=0), in the absence of magnetic field, for four nearest neighbours (outer in the top).

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

In the Bethe-Peierls approximation scheme , [26], 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 [26] 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,

$$\frac{0.693}{ln\frac{factor-1}{e^{\frac{2\beta H}{\gamma}}factor^{\frac{\gamma-1}{\gamma}}-e^{-\frac{2\beta H}{\gamma}}factor^{\frac{1}{\gamma}}}}=\frac{T}{T_c};factor=\frac{\frac{M}{M_{max}}+1}{1-\frac{M}{M_{max}}}. \tag{4}$$

In the following, we describe datas in the table, II, generated from the equation(4) and curves of magnetisation plotted on the basis of those datas. 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.

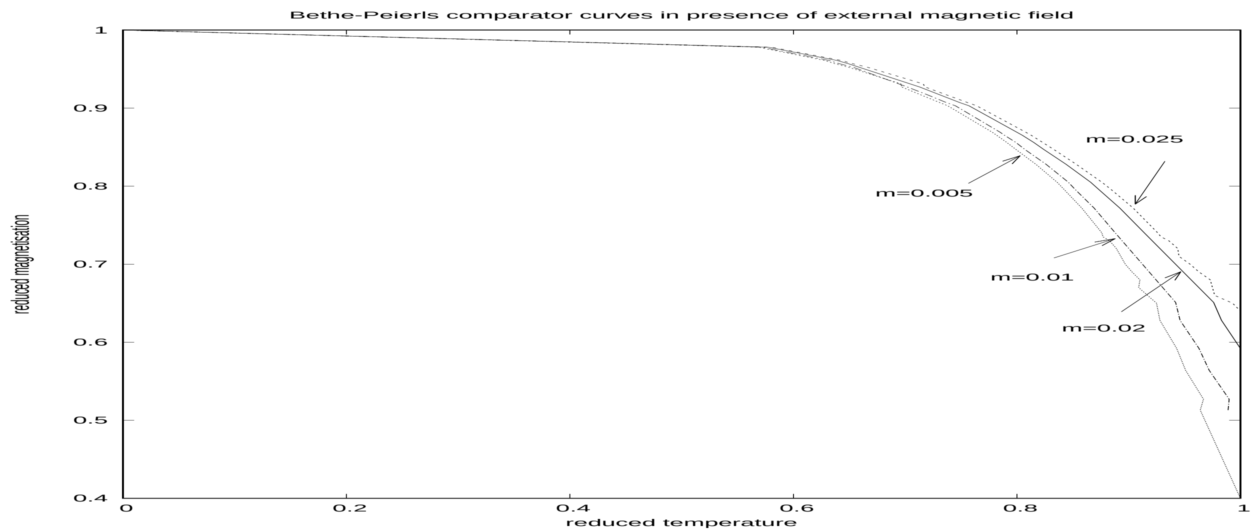

FIG. 2. Reduced magnetisation vs reduced temperature curves for Bethe-Peierls approximation in presence of little external magnetic fields, for four nearest neighbours, with $\beta H = 2m$.

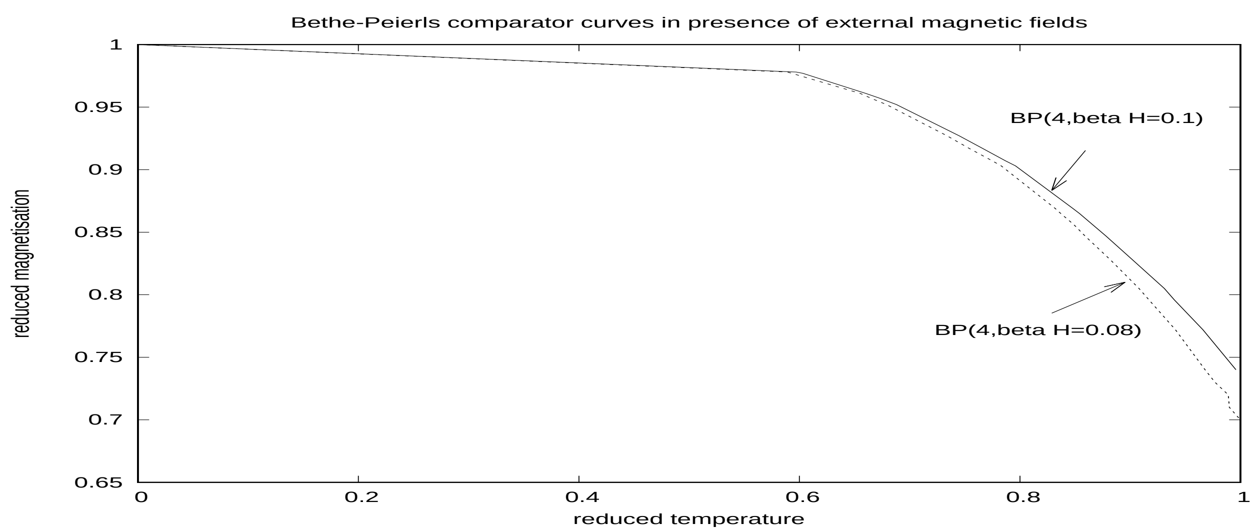

FIG. 3. Reduced magnetisation vs reduced temperature curves for Bethe-Peierls approximation in presence of little external magnetic fields, for four nearest neighbours, with $\beta H = 2m$.

reduced temperature, $\frac{T}{T_c}$					$\frac{M}{M_{max}}$,
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

D. Onsager solution

At a temperature T, below a certain temperature called phase transition temperature, T_c, for the two dimensional Ising model in absence of external magnetic field i.e. for H equal to zero, the exact, unapproximated, Onsager solution gives reduced magnetisation as a function of reduced temperature as, [27], [28], [29], [26],

$$\frac{M}{M_{max}} = [1 - (sinh\frac{0.8813736}{\frac{T}{T_c}})^{-4}]^{1/8}.$$

Graphically, the Onsager solution appears as in fig.4.

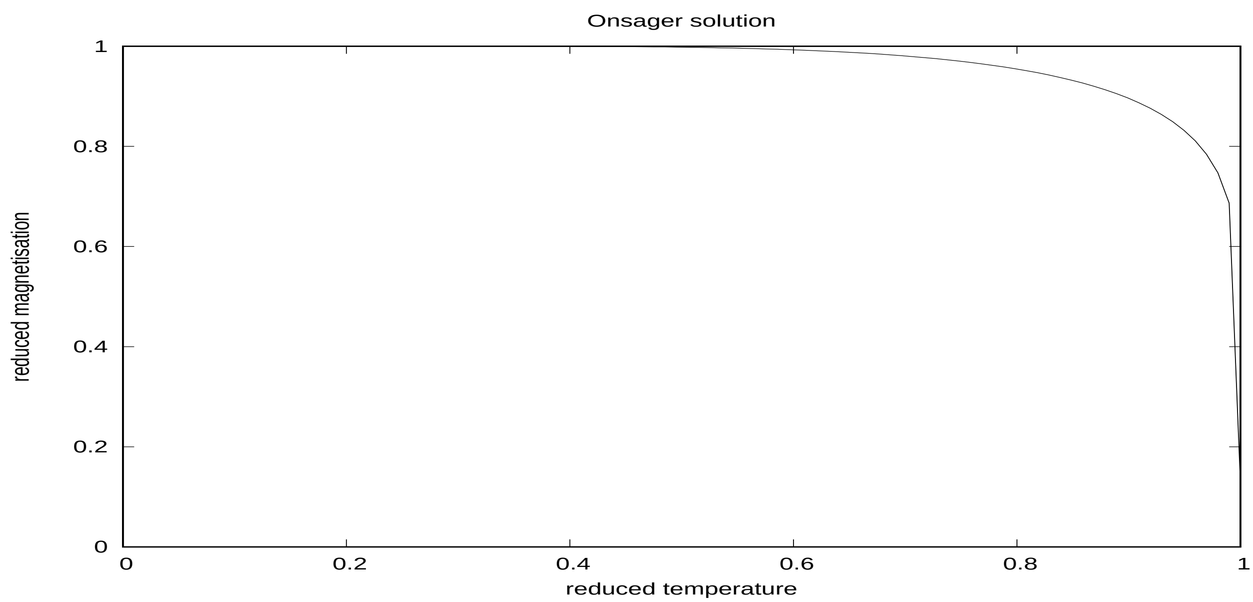

FIG. 4. Reduced magnetisation vs reduced temperature curves for exact solution of two dimensional Ising model, due to Onsager, in absence of external magnetic field

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
3303	1557	3719	1992	1175	1737	1482	6	3508	0	15	1043	2215	668	878	3218	189	2430	4640	1462	317	931	2	9	1	157

TABLE III. Italian words

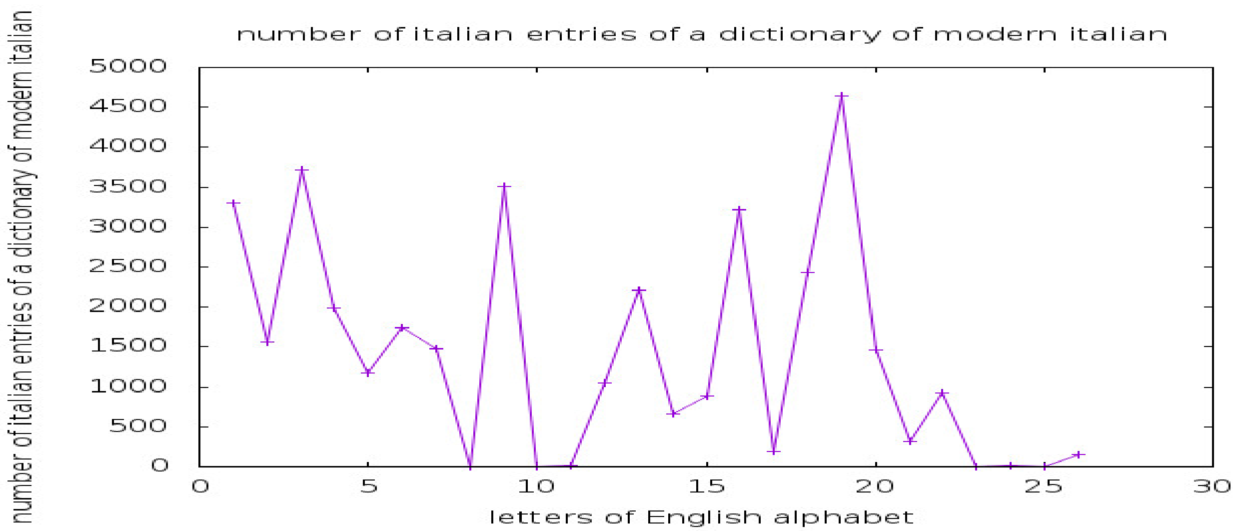

FIG. 5. Vertical axis is number of words of the Italian, [1], and horizontal axis is respective letters. Letters are represented by the sequence number in the alphabet or, dictionary sequence,[1].

III. ANALYSIS OF WORDS OF A DICTIONARY OF MODERN ITALIAN

The Italian language alphabet is composed of twenty six letters like English. We count all the Italian entries of A Dictionary of Modern Italian, [1], one by one from the beginning to the end, starting with different letters. The result is the table, III.

Highest number of entries, four thousand six hundred forty, starts with the letter S followed by entries numbering three thousand seventy hundred nineteen beginning with C, three thousand five hundred eight with the letter I etc. To visualise we plot the number of words against respective letters in the dictionary sequence, [1], in the figure fig.5.

For the purpose of exploring graphical law, we assort the letters according to the number of words, in the descending order, denoted by f and the respective rank, denoted by k. k is a positive integer starting from one. The lowest value of f is one, corresponding to the letter Y. The respective rank, k, denoted as k_{lim} is twenty five. As a result both $\frac{lnf}{lnf_{max}}$ and $\frac{lnk}{lnk_{lim}}$ varies from zero to one. Then we tabulate in the adjoining table, IV and plot $\frac{lnf}{lnf_{max}}$ against

$\frac{lnk}{lnk_{lim}}$ in the figure fig.6.

We then ignore the letter with the highest of words, tabulate in the adjoining table, IV and redo the plot, normalising the lnfs with next-to-maximum $lnf_{nextmax}$, and starting from $k = 2$ in the figure fig.7. Normalising the lnfs with next-to-next-to-maximum $lnf_{nextnextmax}$, we tabulate in the adjoining table, IV, and starting from $k = 3$ we draw in the figure fig.8. Normalising the lnfs with next-to-next-to-next-to-maximum $lnf_{nextnextnextmax}$ we record in the adjoining table, IV, and plot starting from $k = 4$ in the figure fig.9. Normalising the lnfs with next-to-next-to-next-to-next-to-maximum $lnf_{nnnnmax}$ we record in the adjoining table, IV, and plot starting from $k = 5$ in the figure fig.10. Normalising the lnfs with nextnextnextnextnext-maximum $lnf_{nnnnnmax}$ we record in the adjoining table, IV, and plot starting from $k = 6$ in the figure fig.11. Normalising the lnfs with 6n-max, lnf_{6n-max} and 10n-maximum lnf_{10nmax} we record in the adjoining table, IV, and plot starting from $k = 7$ and $k = 11$ in the figures fig.12, fig.13 respectively.

k	lnk	lnk/lnk_{lim}	f	lnf	lnf/lnf_{max}	lnf/lnf_{n-max}	lnf/lnf_{2nmax}	lnf/lnf_{3nmax}	lnf/lnf_{4nmax}	lnf/lnf_{5nmax}	lnf/lnf_{6nmax}	lnf/lnf_{10nmax}
1	0	0	4640	8.442	1	Blank	Blank	Blank	Blank	Blank	Blank	Blank
2	0.69	0.214	3719	8.221	0.974	1	Blank	Blank	Blank	Blank	Blank	Blank
3	1.10	0.342	3508	8.163	0.967	0.993	1	Blank	Blank	Blank	Blank	Blank
4	1.39	0.432	3303	8.103	0.960	0.986	0.993	1	Blank	Blank	Blank	Blank
5	1.61	0.500	3218	8.077	0.957	0.982	0.989	0.997	1	Blank	Blank	Blank
6	1.79	0.556	2430	7.796	0.923	0.948	0.955	0.962	0.965	1	Blank	Blank
7	1.95	0.606	2215	7.703	0.912	0.937	0.944	0.951	0.954	0.988	1	Blank
8	2.08	0.646	1992	7.597	0.900	0.924	0.931	0.938	0.940	0.974	0.986	Blank
9	2.20	0.683	1737	7.460	0.884	0.907	0.914	0.921	0.924	0.957	0.968	Blank
10	2.30	0.714	1557	7.351	0.871	0.894	0.901	0.907	0.910	0.943	0.954	Blank
11	2.40	0.745	1482	7.301	0.865	0.888	0.894	0.901	0.904	0.937	0.948	1
12	2.48	0.770	1462	7.288	0.863	0.887	0.893	0.899	0.902	0.935	0.946	0.998
13	2.56	0.795	1175	7.069	0.837	0.860	0.866	0.872	0.875	0.907	0.918	0.968
14	2.64	0.820	1043	6.950	0.823	0.845	0.851	0.858	0.860	0.891	0.902	0.952
15	2.71	0.842	931	6.836	0.810	0.832	0.837	0.844	0.846	0.877	0.887	0.936
16	2.77	0.860	878	6.778	0.803	0.824	0.830	0.836	0.839	0.869	0.880	0.928
17	2.83	0.879	668	6.504	0.770	0.791	0.797	0.803	0.805	0.834	0.844	0.891
18	2.89	0.898	317	5.759	0.682	0.701	0.706	0.711	0.713	0.739	0.748	0.789
19	2.94	0.913	189	5.242	0.621	0.638	0.642	0.647	0.649	0.672	0.681	0.718
20	3.00	0.932	157	5.056	0.599	0.615	0.619	0.624	0.626	0.649	0.656	0.693
21	3.04	0.944	15	2.708	0.321	0.329	0.332	0.334	0.335	0.347	0.352	0.371
22	3.09	0.960	9	2.197	0.260	0.267	0.269	0.271	0.272	0.282	0.285	0.301
23	3.14	0.975	6	1.792	0.212	0.218	0.220	0.221	0.222	0.230	0.233	0.245
24	3.18	0.988	2	0.693	0.082	0.084	0.085	0.086	0.086	0.089	0.090	0.095
25	3.22	1	1	0	0	0	0	0	0	0	0	0

TABLE IV. A Dictionary of Modern Italian: ranking,natural logarithm, normalisations

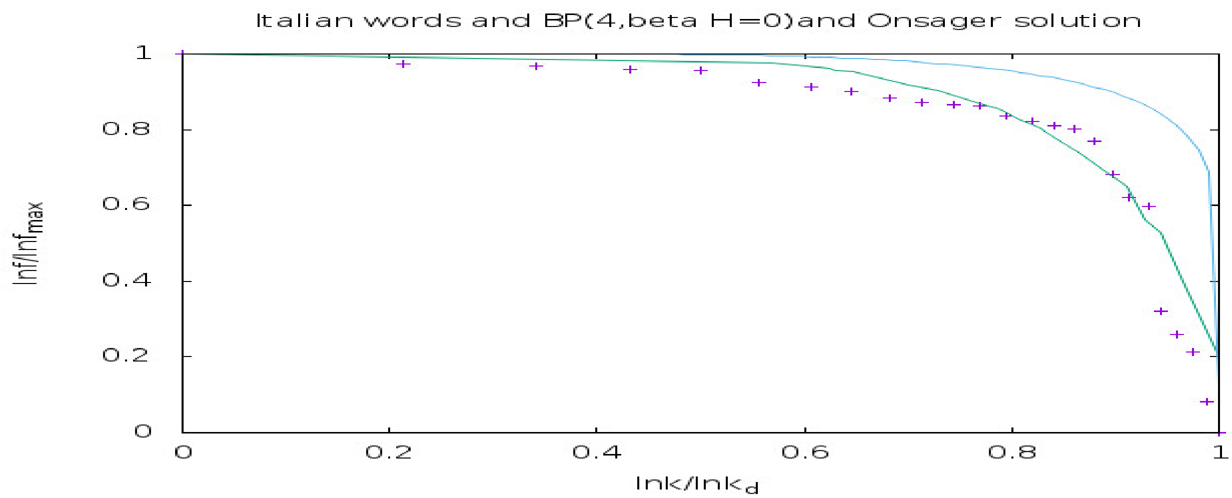

FIG. 6. The vertical axis is $\frac{lnf}{lnf_{max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the words of the Italian with the fit curve being the Bethe-Peierls curve with four nearest neighbours, in the absence of external magnetic field. The uppermost curve is the Onsager solution.

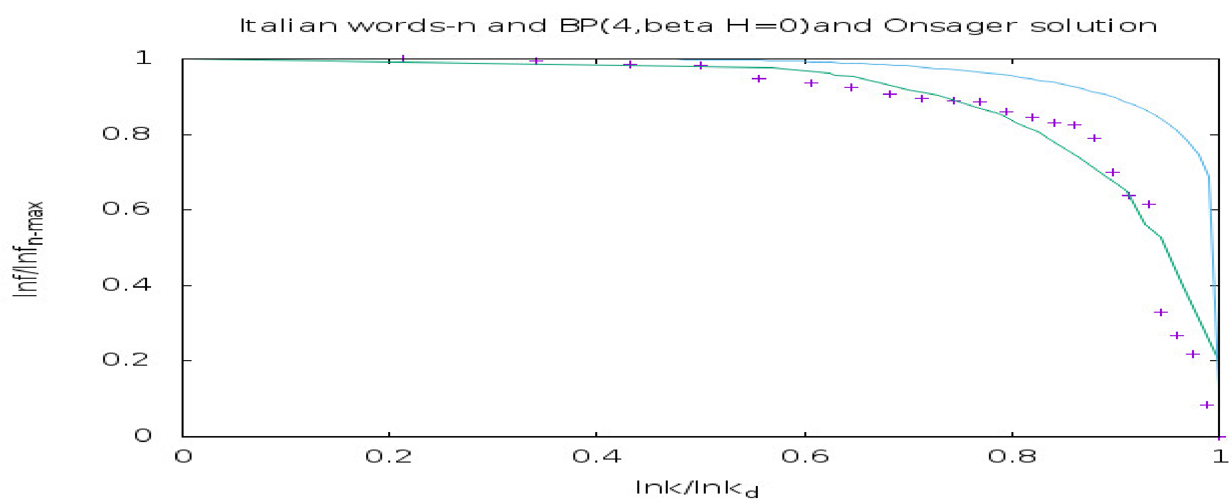

FIG. 7. The vertical axis is $\frac{lnf}{lnf_{next-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the words of the Italian with the fit curve being the Bethe-Peierls curve with four nearest neighbours, in the absence of external magnetic field. The uppermost curve is the Onsager solution.

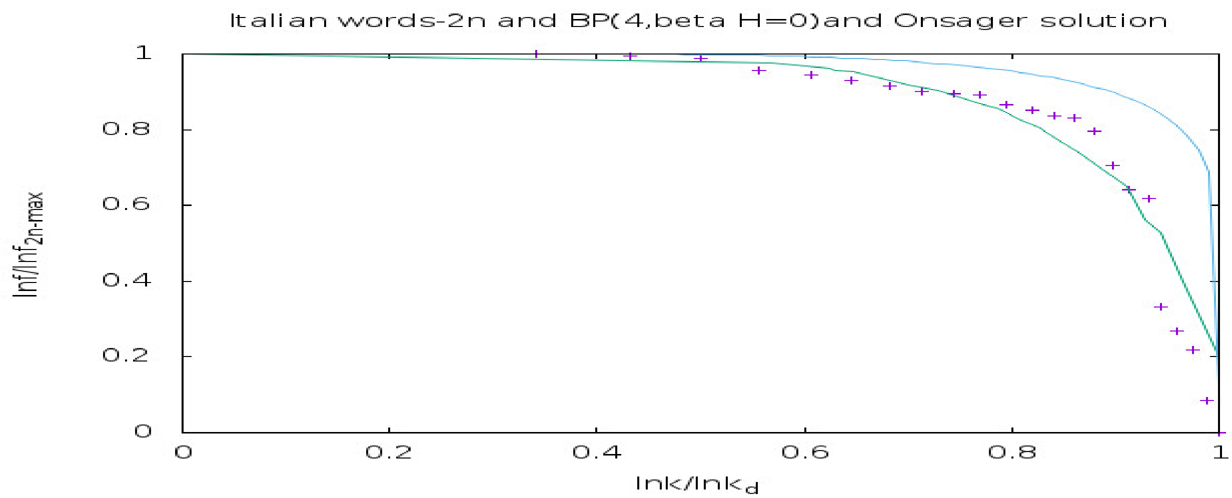

FIG. 8. The vertical axis is $\frac{lnf}{lnf_{nextnext-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the words of the Italian with the fit curve being the Bethe-Peierls curve with four nearest neighbours, in the absence of external magnetic field. The uppermost curve is the Onsager solution.

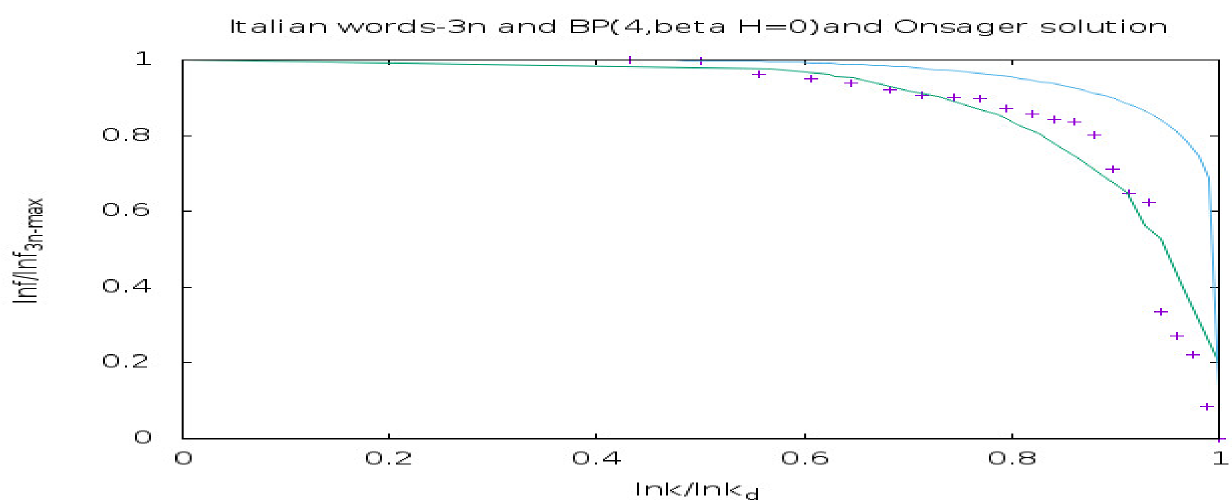

FIG. 9. The vertical axis is $\frac{lnf}{lnf_{nextnextnext-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the words of the Italian with the fit curve being the Bethe-Peierls curve with four nearest neighbours, in the absence of external magnetic field. The uppermost curve is the Onsager solution.

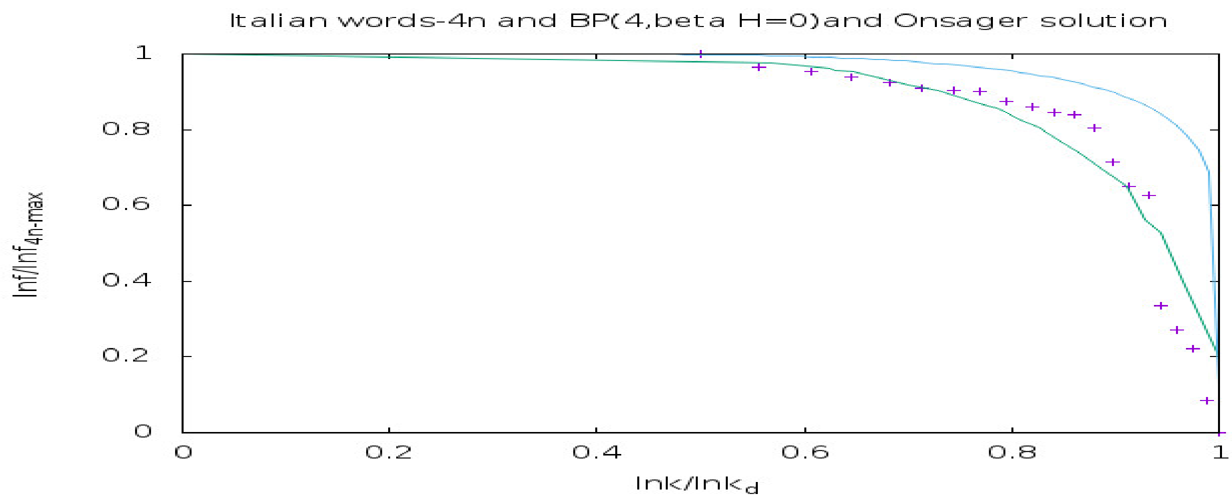

FIG. 10. The vertical axis is $\frac{lnf}{lnf_{nextnextnextnext-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the words of the Italian with the fit curve being the Bethe-Peierls curve with four nearest neighbours, in the absence of magnetic field. The uppermost curve is the Onsager solution.

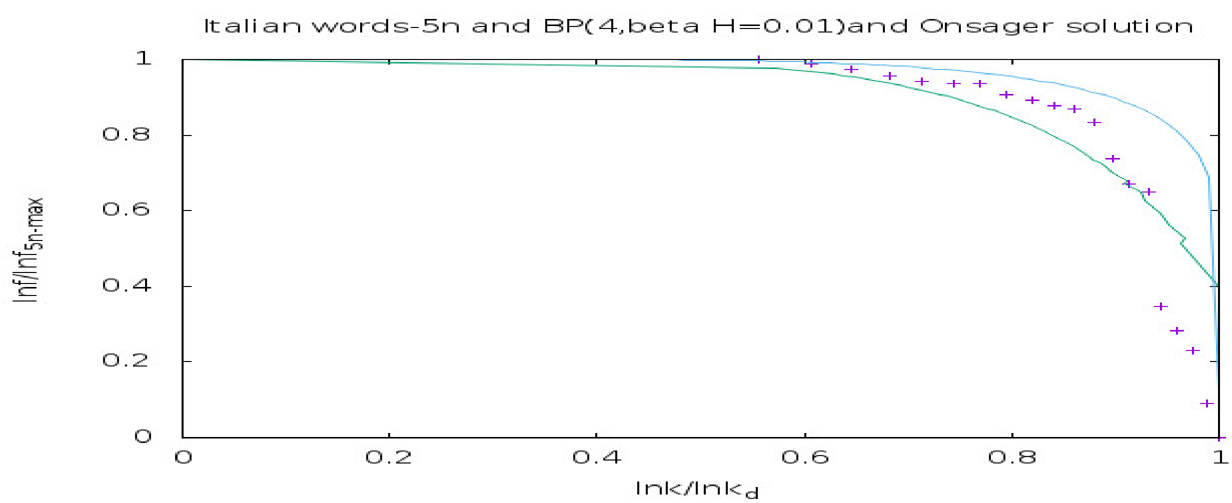

FIG. 11. The vertical axis is $\frac{lnf}{lnf_{nnnnn-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the words of the Italian with fit curve being the Bethe-Peierls curve with four nearest neighbours, in presence of little magnetic field, m=0.005 or, $\beta H = 0.01$. The uppermost curve is the Onsager solution.

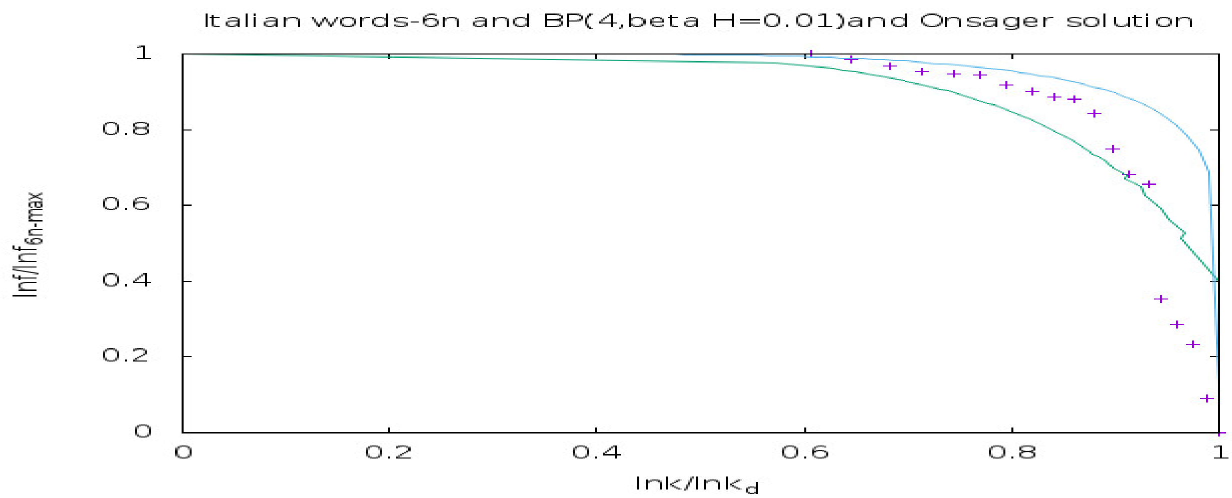

FIG. 12. The vertical axis is $\frac{lnf}{lnf_{6n-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the words of the Italian with the fit curve being the Bethe-Peierls curve with four nearest neighbours, in presence of little magnetic field, m=0.005 or, $\beta H = 0.01$. The uppermost curve is the Onsager solution.

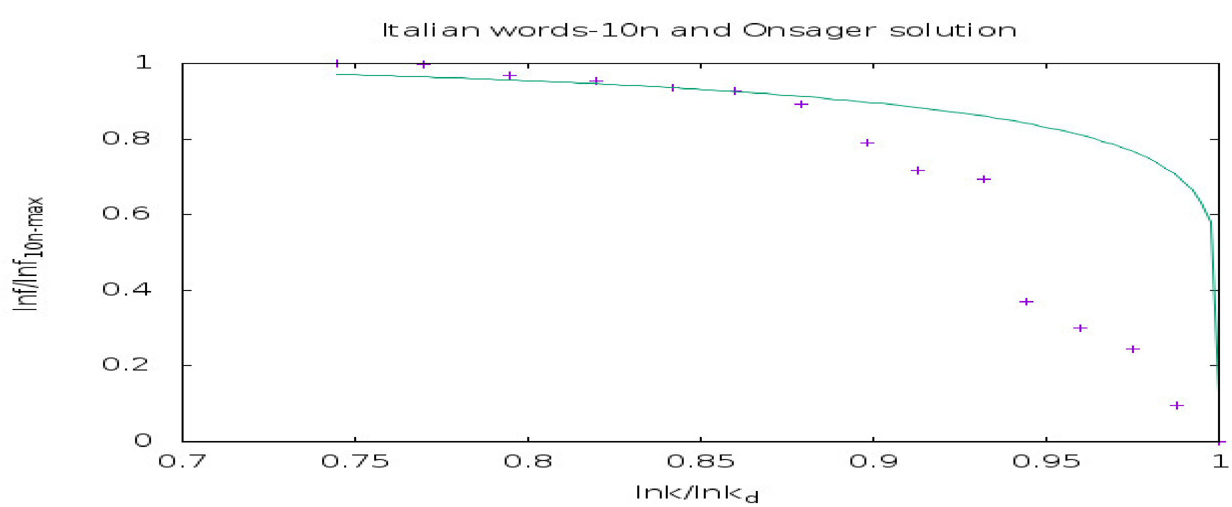

FIG. 13. The vertical axis is $\frac{lnf}{lnf_{10n-max}}$ and the horizontal axis is $\frac{lnk}{lnk_{lim}}$. The + points represent the words of the Italian language. The reference curve is the Onsager solution.

A. conclusion

From the figures (fig.6-fig.13), we observe that there is a curve of magnetisation, behind the entries of Italian language,[1]. This is the magnetisation curve, BP(4,βH=0), in the Bethe-Peierls approximation in the absence of external magnetic field.

Moreover, the associated correspondence is,

$$\frac{lnf}{lnf_{next-maximum}} \longleftrightarrow \frac{M}{M_{max}},$$

$$lnk \longleftrightarrow T.$$

k corresponds to temperature in an exponential scale, [31].

On the top of it, on successive higher normalisations, entries of the Italian,[1], do not go over to Onsager solution, in the normalised lnf vs $\frac{lnk}{lnk_{lim}}$ graphs.

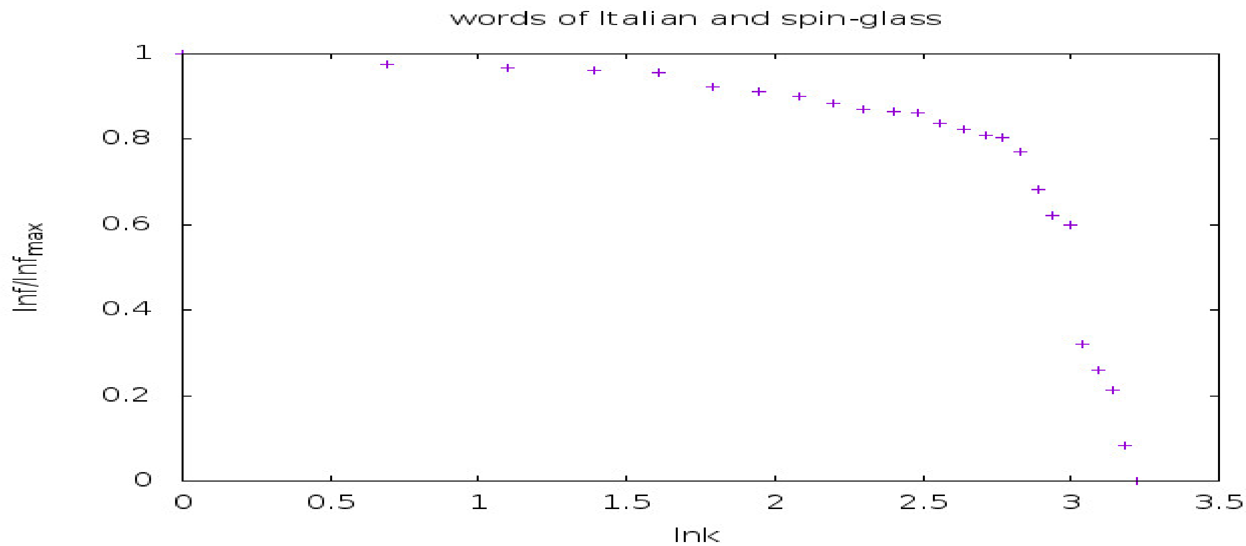

FIG. 14. Vertical axis is $\frac{lnf}{lnf_{max}}$ and horizontal axis is lnk. The + points represent the entries of the Italian language.

IV. ITALIAN AND ROMANCE LANGUAGES

"All languages are subject to a continuous precess of growth and decay, but the modernization of Italian in the last fifty years has been unusually rapid. This is seen in style and vocabulary."

.....John Purves in the preface, [1]

To explore for the possible existence of the spin-glass transition, in the presence of little external magnetic field, which is the hallmark of the Romance langauges, $\frac{lnf}{lnf_{max}}$ is drawn against lnk in the figures fig.14, fig.15 and fig.16.

In the figures fig.14-16, the points has a smoothed transition, rather than a clear-cut transition. Above the transition point(s), the lines are with slopes, more than that of Spanish as seen in the figure fig.15, far more than that of the Basque or, the Romanian, as seen in the figure fig. 16, rather than horizontal and below the transition point(s), points-line rises straight. Hence, the words of the Italian, [1], has little resemblance of a Spin-Glass magnetisation curve, [32], in the presence of little external magnetic field. Modernization has taken off the Romance character almost completely, from the Italian language.

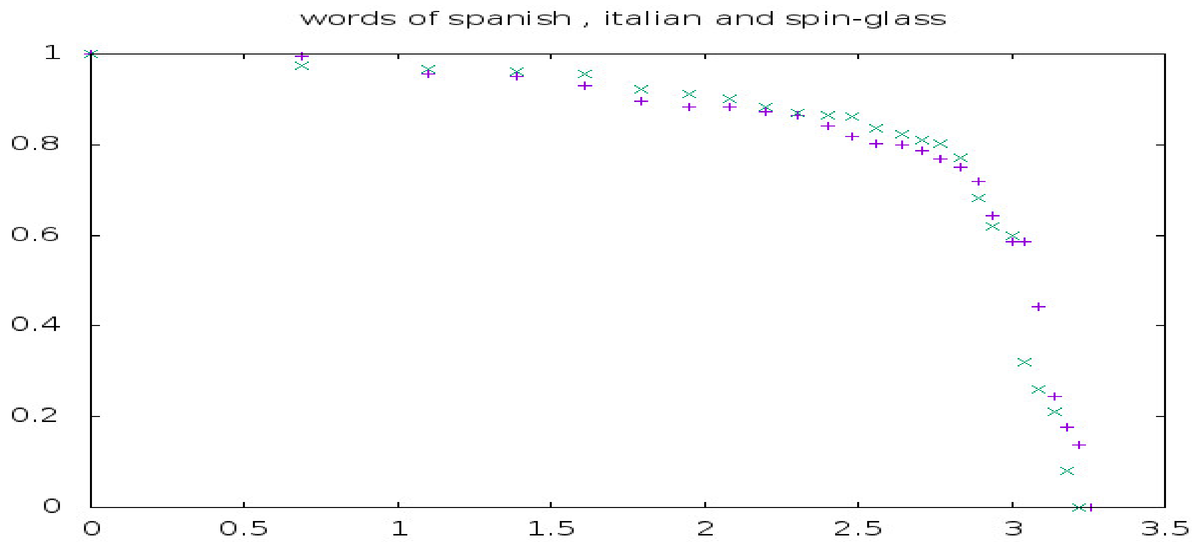

FIG. 15. Vertical axis is $\frac{lnf}{lnf_{nn-max}}$ and horizontal axis is lnk. The + points represent the entries of the Spanish language, [19]. The × points represent the entries of the Italian language, [1].

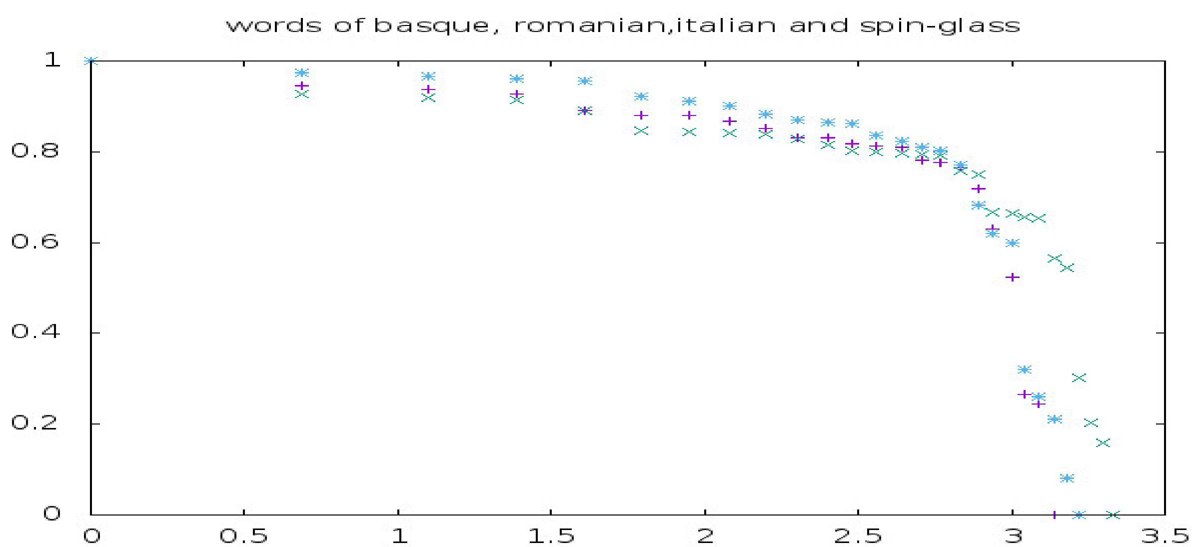

FIG. 16. Vertical axis is $\frac{lnf}{lnf_{max}}$ and horizontal axis is lnk. The + points represent the entries of the Basque language, [5]. The ∗ points represent the entries of the Italian language, [1]. The × points represent the entries of the Romanian language, [6].

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
1977	642	2203	1473	970	907	412	433	1435	199	52	698	917	501	781	2015	77	1342	2115	842	449	302	538	3	17	11

TABLE V. Words of Law and Administration

V. ITALIAN, LAW AND ADMINISTRATION

"The Roman contribution to civilization was in law, government and peace..."
..... E.T.Bell, on The European Depression,[33].

Naturally the subject of law should be ingrained in the culture, embedded in the language. Here in this section, we take a curious dip into this aspect by comparing a dictionary of law and administration, [20], we have studied before, [3], with this dictionary of the Italian, [1]. We have counted, [3], all the entries of Dictionary of Law and Administration, [20], one by one from the beginning to the end, starting with different letters. The result is the table, V.

We have observed that there is a curve of magnetisation, behind the entries of the Italian language,[1]. This is magnetisation curve, BP(4,βH=0), in the Bethe-Peierls approximation in the absence of external magnetic field. This is also the case with the dictionary of law and administartion, [3] i.e. underlying magnetisation curve is BP(4,βH=0). To bring the parallel in the forefront, we compare the the patterns of variations of number of entries along the English alphabet for both the dictionaries in the figure, 17.

We conclude that the words of the Italian, [1], and the entries of law and administartion, [20], are rising and falling in unison along the letters of the English alphabet in almost all the places.

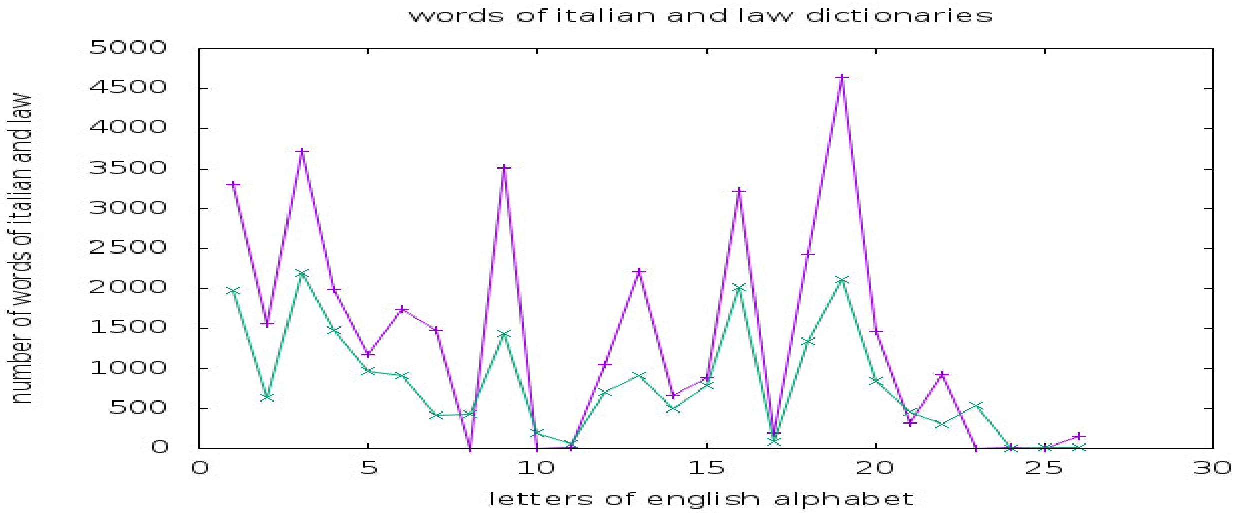

FIG. 17. The vertical axis is number of entries and the horizontal axis is respective letters. Letters are represented by the sequence number in the English alphabet. The + points represent the Italian words. The $\times$ points represent the entries of a law and administartion dictionary, [20].

VI. ACKNOWLEDGMENT

We have used gnuplot for plotting the figures in this paper.

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