Jiang Number Theory (JNT)
蒋（春暄）数论（JNT）

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Abstract :
摘要

Jiang Chun-Xuan is a Chinese mathematician who claims to have developed new number theoretic tools consisting mostly in the Jiang function $J_n(s\#)$ where $s\# = 2.3.5...p, p < n$ denotes the primorial function to solve fundamental problems in Number Theory such as the Goldbach Conjecture, the Twin Prime Conjecture, the k-tuple Conjecture, *et al.*

蒋春暄是一位中国数学家，他声称已经开发了新的数学工具，主要包括在蒋函数 $J_n(s\#)$ 中，其中 $s\# = 2.3.5...p, p < n$ 代表解决数论基础问题的素数函数，例如哥德巴赫猜想（Goldbach Conjecture）、孪生素数猜想（Twin Prime Conjecture）、k-tuple Conjecture（k-生素数猜想）等等。

The fundamental motivation of Jiang to develop a number theory different from the one we are familiar with (we, number theorists) comes from his recent claim (1997) that the Riemann Hypothesis (RH) which lies at the foundations of all prime number theories, is false, that all calculations done to improve it are false, and that the entire speculative theory done through it (see Connes, Bombieri, Zagier *et al.*) are obviously false.

蒋（春暄）开发与我们熟习的数论（我们，数论家）不同的一种数论的实质性动机，来自他近年（1997）声称黎曼假设（RH）作为所有素数数论的基础（这种认识）是错误的，而且所有欲改进它的计算也多错误，并且从头到尾的整个投机性理论（参看 Connes、Bombieri、Zagier 等学者的文献）也显然都错误。

Our goal in this paper will be to review Jiang’s achievements from his disproof of RH to his establishment of the new number theory.

本文的目的是审视蒋（春暄）的成就，自他否定黎曼假设开始，到他创立的新数论。

（Note：The Title and Abstract is translated by Chen I-wan）
（注：标题与摘要由陈一文译成中文）

1) Jiang 1997 disproof of RH :
1) 蒋（春暄）1997 否定 RH（黎曼假设）

The function $\zeta(s)$ of the great mathematician Riemann is defined over the complex number by

$$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s} = \prod_p \frac{1}{1 - \frac{1}{p^s}}$$

and is claimed by Riemann himself [2] to satisfy the following functional equation

$$\pi^{-\frac{s}{2}}\Gamma\left(\frac{s}{2}\right)\zeta(s)=\pi^{-\frac{1-s}{2}}\Gamma\left(\frac{1-s}{2}\right)\zeta(1-s)$$

where $\Gamma(s)=\int_0^\infty e^{-t}t^{s-1}dt$ denotes the Euler Gamma function.
The simplest form of Riemann functional equation is often denoted by

$$\xi(s)=\xi(1-s)$$

In their independent 1896 proofs of the prime number theorem, Hadamard and De La Vallée Poussin stated basically that

$$\zeta(s)\neq 0, s=1$$

and it is basically evident that $\zeta(s)$ has no zero for s=0.

Riemann it his epoch-making 1859 paper [2] stated that all the nontrivial roots of his function lie in the critical strip [0,1] and made the following:

Riemann Hypothesis (RH) : $\zeta(s)=0\Leftrightarrow s=\frac{1}{2}+it$ where one ignores the trivial zeros –2,-4, *et al*.

RH has become throughout the past decades the most fundamental problem in Analytic Number Theory and prime number theory.

In [1] Jiang defined a new function $\beta(s)$ that is the dual of Riemann zeta-function:

$$\beta(s)=\sum_{n=1}^{\infty}\frac{\lambda(n)}{n^s}=\prod_p\frac{1}{1+\frac{1}{p^s}}$$

where $\lambda(n)$ denotes the Liouville function and the duality is exhibited by :

$$\zeta(s)\beta(s)=\zeta(2s)$$

and then directly

$$\zeta(1+it)=\zeta\left(\frac{1}{2}+it\right)\beta\left(\frac{1}{2}+it\right)$$

Jiang mostly proved in [1] that the beta-function is not infinite for real part equal to ½ and then, following the fundamental remark of Hadamard and De la Vallée Poussin, Riemann zeta-function cannot have nontrivial zeros in the said critical line $\text{Re}(s)=\frac{1}{2}$.

Jiang starts with an amaizing expression for both $\beta(s)$ and $\zeta(s)$ which he coins their *exponential formulas*. These formulas, to the best knowledge of the present author, are not found in other RH books (in none of them) and are sufficient to Jiang to follow his entire disproof.

Formula 1 :

$$\zeta(s) = \frac{1}{\prod_p \sqrt{1 - \frac{2\cos(t\log p)}{p^\sigma} + \frac{1}{p^{2\sigma}}}} e^{-\left(\sum_p \tan^{-1} \frac{\sin(t\log p)}{p^\sigma - \cos(t\log p)}\right)}$$

Formula 2 :

$$\beta(s) = \frac{1}{\prod_p \sqrt{1 + \frac{2\cos(t\log p)}{p^\sigma} + \frac{1}{p^{2\sigma}}}} e^{-\left(\sum_p \tan^{-1} \frac{\sin(t\log p)}{p^\sigma + \cos(t\log p)}\right)}$$

Jiang himself does not give any proof of these beautiful identities and the author himself tried by many attempts to construct a proof of these identities.

These formulas are natural if one considers that

Entry 1 :

$$\left|\zeta(s)\right| = \prod_p \frac{1}{\sqrt{1 - \frac{2}{p^s} + \frac{1}{p^{2s}}}}$$

Proof : The proof is obvious

$$\prod_p \frac{1}{\sqrt{1 - \frac{2}{p^s} + \frac{1}{p^{2s}}}} = \prod_p \frac{1}{\sqrt{\left(1 - \frac{1}{p^s}\right)^2}} = \prod_p \frac{1}{\left|1 - \frac{1}{p^s}\right|} = \left|\zeta(s)\right|$$

For all $s \in R, \left|\zeta(s)\right| = \zeta(s)$

The sign of the function is then given, when the complex s are introduced into the formula and this justifies the presence of the trigonometric functions. (A more complete proof won't be short enough in this brief monograph).

However a similar "proof" has to be done in respect to the Jiang beta function to obtain the second identity. (An exactly proof won't be short enough in this brief monograph and relatively useless given the first).

Further considerations about Jiang's proof are found in [1], [3], [4].
参考文献[1]、[3]、[4]钟可以看到关于蒋（春暄）的进一步考虑。

In [4] it is above all seen that the French mathematician Antoine Balan [5] found a result about RH that is the exact opposite of those obtained by Jiang. Therefore it seems to us that the falsity of Jiang's 1997 statement is best showed by showing that Balan is all right. But however Balan is not a number theorist, while Jiang is. Therefore the doubts coming from number theorists have to be assigned with Balan's work rather than to Jiang's.
在所有的参考文献中从参考文献[4]中可以看到法国数学家安托内・巴兰（Antoine Balan）的文献[5]中找到了关于黎曼假设（RH）的一个结果，它与蒋（春暄）获得的结果正好相反。由此，对我们

看来通过表明巴兰（Balan）完全正确是显示蒋（春暄）1997 年声明（译注：否定黎曼假设的声明）虚假的最好方式。

Jiang’s papers have been went worldwide to mathematicians of the stature of Alain Connes, Don Zagier *et al.* but rather than considering Jiang’s contributions in depth they simply ignored it without reading a number or a letter in Jiang’s calculus.
蒋（春暄）的论文已经在世界范围传播到相当于阿兰・寇纳斯（Alain Connes）、顿・扎格尔（Don Zagier）等人这种水平的数学家们，但他们没有深刻考虑蒋（春暄）的贡献反而简单地忽视它，不愿读蒋（春暄）这种水平学者哪怕一个数字或一封信。

One may also imagine how distasteful it should be to mathematician to show them that the greatest mathematical conjecture ever, that seems provide the number theoretical foundations of mathematics. With the time some ultimate beauty has been assigned with the true of RH. To differ from this point of view, Jiang quoted further Iwaniec :
人们可以想象，向一位数学家出示看来为数学提供数论基础的数学猜想是一件多么令人讨厌的事。经过一段时间，对黎曼假设（RH）的真实性已经赋予了某种最终的美好的东西。与这种观点不同，蒋（春暄）进一步引用了伊万额克（Iwaniec）如下一段话：

“Analytic number theory is fortunate to have one of the most famous unsolved problems, the Riemann hypothesis. Not so fortunately, this puts us in a defensive position, because outsiders who are unfamiliar with the depth of the problem, in their pursuit for the ultimate truth, tend to judge our abilities rather harshly. In concluding this talk I wish to emphasize my advocacy for analytic number theory by saying again that the theory flourishes with or without the Riemann hypothesis. Actually, many brilliant ideas have evolved while one was trying to avoid the Riemann hypothesis, and results were found which cannot be derived from the Riemann hypothesis. So, do not cry, there is healthy life without the Riemann hypothesis. I can imagine a clever person who proves the Riemann hypothesis, only to be disappointed not to find new important applications. Well, an award of one million dollars should dry the tears ; no applications are required.” [6]
“解析数论非常幸运还有一个最为有名的未解决的问题，即黎曼假设。但是，不那么幸运的是，这将我们置于一种防御性的地位，因为对这个问题的深度不那么熟悉的外部的人，在他们追求最终真理的努力中，倾向于较为苛刻地判断我们的能力。在结束这次讲话时，我愿通过再次说明，数论将在无论有还是没有黎曼假设的情况下继续繁荣，来强调我对于解析数论的拥护。事实上，在人们试图回避黎曼假设时，许多有才气的想法获得进展，发现了一些绝对不可能得自黎曼假设的结果。所以，不要哭，没有黎曼假设依然能够有健康的生活。我可以想象一个证明了黎曼假设的聪明的人因为未能发现新的重要应用儿失望。好的，一百万美元的奖赏应当能够清掉眼泪；并不需要应用。”[6]

In order to follow the mainstream prime conception, Jiang argues that:
为了遵循主流素数概念，蒋（春暄）这样争辩：

“The distribution of prime number does not involve Quantum chaos, randomness *et al*. There is order in the sequence of prime numbers.” [7]
“素数的分布并不涉及量子混乱、随意性等。素数的序列是有规律的。”[7]

This view has been received with enthusiasm by the great philosopher Stein Johansen in [8].
在文献[8]中，伟大的哲学家热情的接受这样的观点。

Moreover Jiang’s works seems to move along with the development of *Hadronic Mechanics* pioneered by Ruggero Maria Santilli, as seen in [3] and particularly in Isonumber Theory. (If Jiang’s work is right then it is the foundation of Isonumber Theory. In particular Santilli himself claimed in [3] :
此外，从文献[3]来看，蒋（春暄）的工作看来随着 R. M. 桑蒂利（Ruggero Maria Santilli）先驱的强子力学的发展而前进。（如果蒋的工作是正确的话，那么它也形成 Iso 数论的基础。在文献[3]中，桑蒂利自己特别声称这一点。

“I would like to express my utmost appreciation to Professor Chun-Xuan Jiang for having understood the significance of the new iso-, geno-, hyper-numbers and their isoduals I identified for a resolution of the above problems.
“对于蒋春暄教授能够理解作为上述问题我所识别的新的iso-、geno-、hyper-数及其iso孪生数的意义，我愿意表达我的最大感谢。

The significance of the new numbers had escaped other scholars in number theory in the past two decades since their original formulation.
其他数论学者自数论最初形成以来过去二十年期间都忽略了新的数的重大意义。

I would like also to congratulate Professor Jiang for the simply monumental work he has done in this monograph, work that, to my best knowledge, has no prior occurrence in the history of number theory in regard to joint novelty, dimension, diversification, articulation and implications.
我愿对于蒋教授在这部专著中完成的简直不朽的的工作表示祝贺，他的这种工作，据我所知，在数论历史上将新颖、尺度、多样化、清晰度与含意综合在一起方面，以前从来没有出现过。

I have no doubt that Professor Jiang's monograph creates a new era in number theory which encompasses and includes as particular case all preceding work in the field.”
我毫无疑问蒋教授的专著在数论中开辟了一个新时代，它涵盖并特别包括了以前的所有工作。”

More recently Indian number theorist Tribikram Pati claimed to have disproved RH in [9] by showing that RH is equivalent to :

$$e^{\ln a} < a$$

He manifested furthermore interests in Jiang’s works and in reading [1] and [4] in [10].

Resulting correspondence with Schadeck and Pati, Jiang get in 2008 the idea to write a fundamental paper [11] : *Riemann Paper(1859) Is False,* which is not yet published and rejected in block by the number theorist belonging to the mainstream.

In this most astonishing paper (the most impressive he has ever written) Jiang claims that the functional equation stated by Riemann is respected by a function $\overline{\zeta}(s)$ that is not the same that $\zeta(s)$.

In [11] one explicitely founds that

$$\pi^{-\frac{s}{2}}\Gamma\left(\frac{s}{2}\right)n^{-s} = \int_0^\infty x^{\frac{s}{2}-1}e^{-n^2\pi x}dx == \int_0^\infty x^{\frac{s}{2}-1}\left(\frac{\vartheta(x)-1}{2}\right)dx$$

Where $\vartheta(x) := \sum_{n=-\infty}^{\infty} e^{-n^2\pi x}$ is the Jacobi theta function whose functionnal equation is :

$$x^{\frac{1}{2}}\vartheta(x) = \vartheta(x^{-1})$$

where the variable has to be taken positive. From it, which is a most BASIC well-known by all number theorists and even all real mathematicians Jiang claims that he obtains;

$$\overline{\zeta}(s) = \frac{\pi^{\frac{s}{2}}}{\Gamma\left(\frac{s}{2}\right)}\left\{\frac{1}{s(s-1)} + \int_1^\infty (x^{\frac{s}{2}-1} + x^{-\frac{s}{2}-\frac{1}{2}})\cdot(\frac{\vartheta(x)-1}{2})dx\right\}$$

$$\Leftrightarrow \pi^{-\frac{s}{2}}\Gamma\left(\frac{s}{2}\right)\overline{\zeta}(s)=\pi^{-\frac{1-s}{2}}\Gamma\left(\frac{1-s}{2}\right)\overline{\zeta}(1-s)$$

Then the properties of these newly formed function are :

1. $\overline{\zeta}(s)$ has no zero for $\sigma > 1$;
2. The only pole of $\overline{\zeta}(s)$ is at $s = 1$; it has residue 1 and is simple;
3. $\overline{\zeta}(s)$ has trivial zeros at $s = -2, -4, \ldots$ but $\zeta(s)$ has no zeros;
4. The nontrivial zeros lie inside the region $0 \le \sigma \le 1$ and are symmetric about both the vertical line $\sigma = \frac{1}{2}$

and from them Jiang claims that RH is expressed only in term of the new function which we call here the ***pseudozeta-function*** and then refers to his disproof in [1] and says :

$\overline{\zeta}(s)$ and $\zeta(s)$ are the two different functions. It is false that $\overline{\zeta}(s)$ replaces $\zeta(s)$

He finishes his considerations of RH and Riemann's paper by giving brief courses about the new number theory he suggests to the upcoming generation of mathematicians, which manifests :

1. A good connection and a great compatibility (perhaps the greatest) with Santilli's isomathematics which are Lie-admissible mathematics (see [12] for more informations because it should take hundreds of pages to introduce it, that we cannot doing here for evident need of brevity)

2. The Prime distribution manifests order rather than randomness

3. A great are of applications including ISOCRYPTOGRAPHY which may constitute the greatest cryptographic system in the World (see [3] and inspect the impressive last chapter)

4. Deep metamathematical and philosophical consequences as brilliantly seen in [8] by Johansen, with connection to Rowlands' theory of Universal Pattern and the Fibonacci sequences.

5. and so on (the list cannot here be exhaustive and it is recommended to the interested reader to inspect [3] for some more details.

Just like prime number theory and analytic number theory are roughly the study of Riemann zeta function, one has clearly to say that Jiang Number Theory (the new JNT) is EXCLUSIVELY the study of the class of functions $J_n(p\#)$ with respect to the index integer *n*.

Then one has to start with Santilli's basic rules of isomathematics found in [3], [12] and a larger and larger literature, where we start by recalling the *Santilli isounit*

$$\hat{I} = \frac{1}{\hat{T}} \neq 1, \hat{I} > 0$$

with related *Santilli isonumbers*

$$\hat{A} = \hat{I} \times A$$

and *Santilli isoproduct*

$$A \hat{\times} B = A \times \hat{T} \times B$$

and finally the fundamental indentity define for the Santilli isounit through the Santilli isoproduct :

$$\hat{I}\hat{\times}A=\hat{T}^{-1}\hat{T}A=A\hat{\times}\hat{I}=A\hat{T}\hat{T}^{-1}=A$$

etc.

More details are found in Jiang [3] and Santilli [12].

Definition 2.1 (Jiang [3]):

$\hat{d}$ isodivides $\hat{n}$ and we write $\hat{d}\hat{/}\hat{n}$ when $\hat{n}=\hat{c}\hat{\times}\hat{d}$ for some $\hat{c}$

Similarly, $\hat{d}$ does not isodivide $\hat{n}$ and we write $\hat{d}\hat{\nmid}\hat{n}$ when $\hat{n}\neq\hat{c}\hat{\times}\hat{d}$ for some $\hat{c}$.

One notes that isodivisibility is similar to conventional divisibility with respect to Santilli isonumbers and Santilli isoproduct.

From isodivisibility Jiang defines (and it is rather instinctive to define) isocongruences by the following:

Definition 2.1 (Jiang [3]):

Given isointegers $\hat{a},\hat{b},\hat{m}$ with $\hat{m}>0$. We say that â is isocongruent to $\hat{b}$ module $\hat{m}$ and we write

$$\hat{a}\hat{\equiv}\hat{b}(\mathrm{mod}\,\hat{m})$$

when $\hat{d}\hat{/}\hat{n}$.

The isocongruence, just as the isodivisibility, satisfies all axioms of the conventional congruence (resp. the conventional divisibility). Here the term conventional would refer to what is commonly coined *conventional mathematics*, namely *unitary* pre-Santilli mathematics (the author proposed the term *unimathematics* because the unit is always equal to 1 : as says Rowlands quoted in [8] “the 1 is already loaded”.).

Then in [3] Jiang investigates a large number of isoequations consisting into isocongruences and defines the Jiang function $J_n(p)$ through the following theorem:

Theorem 2.13 (Jiang [3]) :

The equation

$$\sum_{i=1}^{n}\hat{x}_i\hat{\equiv}\hat{A}(\mathrm{mod}\,\hat{p})$$

where $\hat{p}\in\hat{P}\equiv\hat{I}P, P=\{p=prime\}$ has exactly $J_n(p)+(-1)^n$ solutions if $\hat{d}\hat{/}\hat{n}$ and has exactly $J_n(p)$ when $\hat{d}\hat{\nmid}\hat{n}$.

Then

Definition A :

(Fundamental definition in Jiang Number Theory)

$$J_n(p) := \frac{(p-1)^n - (-1)^n}{p}$$

Jiang does not give proof of Theorem 2.13 to the best knowledge of the author because theorem 2.13 seems to be obtained through the isotopic lifting of the corresponding theorem in Number Theory into “unimathematics”.

Moreover the Jiang functions $J_n(p)$ is often obtained at the very beginning in [3] to count the number of solutions of such basic isoequations that involve insocongruences and isoprimes and isodivisibility.

An other most general example as in theorem 2.13, that involves multivalued functions of Santilli isointegers is:

Theorem 2.13 (Jiang [3]) :

The equation

$$\overset{\square}{f}\left(\overset{\square}{x}_1,\dots,\overset{\square}{x}_n\right)\hat{\equiv}\overset{\square}{A}(\bmod \overset{\square}{p})$$

has W_n solutions and then $W_n = J_n\left(1+O(1)\right)$.

Hundreds of such theorems which are basically obtained by lifting the unitary ones into “unimathematics” are found in [3].

The function $J_n(p)$ is extended to $J_n(p\#)$ by the definition B still found in [3] by

Definition B :

(Extended fundamental definition in Jiang Number Theory)

$$J_n(p\#) := \prod_{3 \le p \le p_i}\left(\frac{(p-1)^n - (-1)^n}{p}\right)\prod_{p/N}\left(1+\frac{(-1)^n p}{(p-1)^n - (-1)^n}\right)$$

where N denotes a Santilli isointeger.

The most basic property of Jiang function is that $J_n(p\#) \neq 0$.

Jiang claims that he get the idea to define his function in 1997 by making use the basic definitions of Euler’s totient function undefined explicitly but most useful in Arithmetic and usable through a list of simple properties such as:

1. $\phi(p) = p-1$ when p is a prime.
2. $\phi(p^A) = p^A\left(1-\frac{1}{p}\right)$, p a prime, that looks like the product expression of Riemann zeta.
3. $\phi(n)$ is ALWAYS EVEN for all $n \ge 3$.
4. $\phi(n) = n\prod_{p/n}\left(1-\frac{1}{p}\right)$

Usually Euler $\phi(n)$ function is taken to count the number of integers prime to a given integer.
One has firstly to note the resemblance between $\phi(p)$ through its 4th property and the Definition B of Jiang function.

Moreover, given the formal definition of what the number theorists now call the *twin prime constant* Π_2

$$\Pi_2 = \prod_{3 \le p} \left(1 - \frac{1}{(1-p)^2} \right)$$

one should think that it is deeply connected to Jiang function and also related to Riemann zeta-function, as the author could have shown it in a paper that would perhaps be published after the present year.

We would claim here that

Definition C :

(non-formal given the mathematical knowledge of our time)

Euler's $\phi(n)$ function is the arithmetical *pattern* of Jiang's $J_n(p\#)$ function throughout Santilli's Isomathematics, that is, Jiang's $J_n(p\#)$ function is naturally generated into Isomathematics through Euler's $\phi(n)$ function.

Jiang often says in [3] that Jiang's $J_n(p\#)$ function is a generalization in fact of Euler's $\phi(n)$ function, that it counts the number of solutions of basic isoequations from which its definition follows, just as Euler's $\phi(n)$ function counts the numbers of integers that are prime to a given integer and less than itself.

Jiang himself says :

"Let p#=30, Euler function ϕ(30)=pi(p-1)=8 ,We have (30,j)=1 [where (a,b) denotes the gretest common divisor gcd],where j=1,7,11,13,17,19,23,29. We have 8 equations,p(j)=30i+j, j=1,7,11,13,17,19,23,29.Every has infinitely many prime solutions

We study twin primes p2=p1+2,J_2(30)=pi(p-2)=3.We have 3 twin primes subequations:p2=p(11)+2=p(13),p2=p(17)+2=p(19),p2=p(29)+2=p(1).Every has infinitely many twin primes solutions.

We study p3=p2+p1+1, 8^2=64 .We have 64 equations,J_3(30)=pi[(p-1)^2-x(p)]=pi[p^2-3p+3]=39.We have 39 subequations:p3=p(1)+p(11)+1 write as p3=1+11+1,11+1+1,1+17=1,17+1+1,1+29+1,29+1+1,11+11+1,11+17+1,17+11+1,11+19+1,19+11+1,11+29+1,29+11+1,13+17+1,17+13+1,13+23+1,23+13+1,13+29+1,29+13+1,17+19+1,19+17+1,17+23+1,23+17+1,17+29+1,29+17+1,19+23+1,23+19+1,19+29+1,29+19+1,23+23+1,23+29+1,29+23+1,29+29+1.Every has infinitely many prime solutions.

We study p4=p3+p2+p1+2.8^3=512,we have 512 equations.J_4(30)=pi[(p-1)^3-x(p)]=pi[p^3- 4p^2+6p-4}=255.we have 255 subequations of p4=p3+p2+p1+2, p4=1+7+7+2,....,every has infinitely many prime solutions." [13]

The function $J_n(p\#)$ of Jiang is shown in [3] to exhibit a lot of amaizing functional properties which are exhaustively:

1. $J_n\left(2^m\right)=\phi^{n-1}\left(2^m\right)=2^{(n-1)(m-1)}$

2. $J_n(1)=J_1(p\#)=J_n(2)=1$

3. $J_n(ab)=J_n(a)J_n(b),(a,b)=1$

4. $J_n\left(\xi^m\right)=\omega^{(n-1)(m-1)}J_n\left(\xi\right)$

5. $J_n(\xi)=\sum_{k=1}^{\phi(\xi)}J_{n-1}\left(\xi,p_k\right)$

6. $J_n(ab)=\dfrac{d^{n-1}J_n(a)J_n(b)}{J_n(d)},(a,b)=d$

7. $\left(\dfrac{(p-1)^n-(-1)^n}{p}\right)-\left(\dfrac{(p-1)^{n-2}-(-1)^{n-2}}{p}\right)=(p-1)^{n-2}(p-2)$

8. $J_n(\xi,k-2)\geq J_n(\xi,k-1)$

9. $\dfrac{J_n(\xi^m)(\xi^m)^{k-1}}{\phi^{n+k-2}(\xi^m)}=\dfrac{J_n(\xi^m)\xi^{k-1}}{\phi^{n+k-2}(\xi^m)}$

10. $(p-1)^{n-1}=\dfrac{(p-1)^n-(-1)^n}{p}+\dfrac{(p-1)^n-(-1)^n}{p}=J_n(p)+J_{n-1}(p)$

11. $a/b\Rightarrow J_n(a)/J_n(b),n\succ 1$

However these 11 properties seem to set up Jiang's function as the most amaizing function or "analytical toy" ever built.

Unfortunately no demonstrations of the 11 magic properties are known. Perhaps Jiang himself will be able to give us them, because they are best needed to make conventional number theorists interested about his contributions and to improve some of his statements.

From the most general $J_n(p\#)$ Jiang defines a series of particular functions such as :

Definition A.1 :

$$J_1(p)\qquad =J_1(p\#)=1$$

Definition B.1 :

$$J_2(\xi) = \prod_{3 \le p \le p_i} (p-2) \prod_{p/n} \frac{p-1}{p-2}$$

$$J_2(\xi) \ne 0$$

$$J_2(\xi) = \prod_{5 \le p \le p_i} (p-4)$$

$$J_2(\xi) = 6 \prod_{11 \le p \le p_i} (p-5)$$

$$J_2(\xi) = \prod_{7 \le p \le p_i} (p-6)$$

$$J_2(\xi) = 2 \prod_{11 \le p \le p_i} (p-7)$$

Note the most resemblance with the twin prime constant through its simplest expression. Dozens of different expressions are found in Jiang [3].

Definition B.2 :

$$J_3(\xi) = \prod_{3 \le p \le p_i} p^2 - 3p + 3 - (p-2)\left(\frac{-\hat{b}}{p}\right)$$

$$J_3(\xi) = \frac{1}{2} \prod_{3 \le p \le p_i} \left(1 - \frac{1}{(p-1)^2}\right) \prod_{p/N} \frac{p-1}{p-2} \frac{N^2}{\log^3 N} (1 + O(1))$$

$$J_2(\xi) = \phi(\xi) \prod_{3 \le p \le p_i} (p-2) \prod_{p/n} \frac{p-1}{p-2}$$

Definition B.3 :

$$J_4(\xi) = \prod_{3 \le p \le p_i} \left(\frac{(p-1)^4 - 1}{p} - \frac{(p-1)^3 + 1}{p}\right)$$

Definition B.4 :

$$J_5(\xi) = \prod_{3 \le p \le p_i} \left((p-1)^4 - \left((p-2)^3 - (p-2)^2 + p - 3 \right) \right)$$

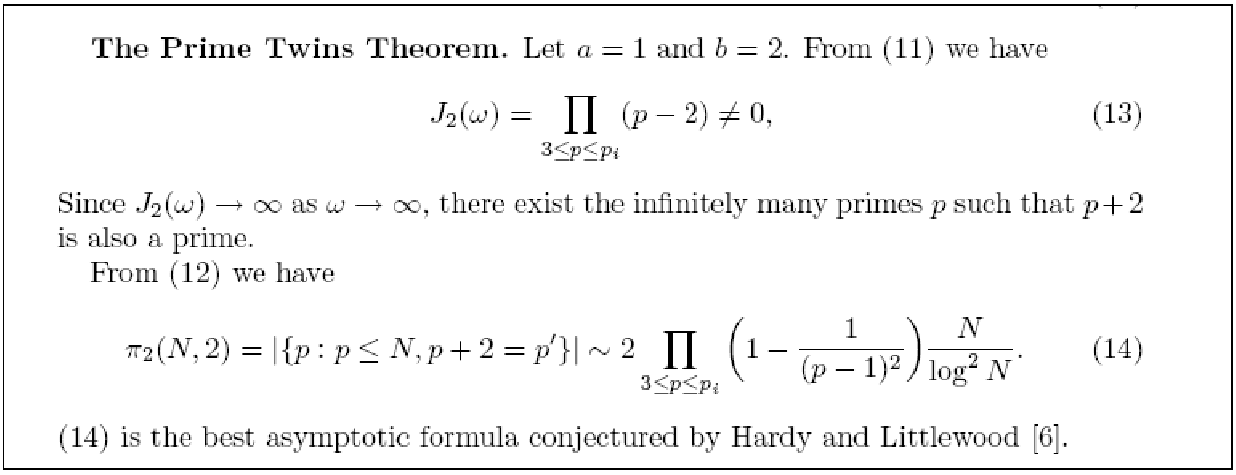
Definition B.5 :

$$J_6(\xi) = \prod_{3 \le p \le p_i} \left((p-1)^5 - \left((p-2)^4 - (p-2)^3 + (p-2)^2 - p + 3 \right) \right)$$

Note that the definition of the twin prime constant clearly appears in the right side of the second expression of the definition B.2.

An infinitude of such functions can be built to raise number theoretic problems. The most useful are by far those presented in defs. B.1/B.2/B.3.

Using them Jiang claims to have proved the Goldbach Conjecture and the Twin Prime Conjecture. Here one reproduces his claimed proofs from [3]:



The Prime Twins Theorem. Let $a = 1$ and $b = 2$. From (11) we have

$$J_2(\omega) = \prod_{3 \le p \le p_i} (p-2) \ne 0, \tag{13}$$

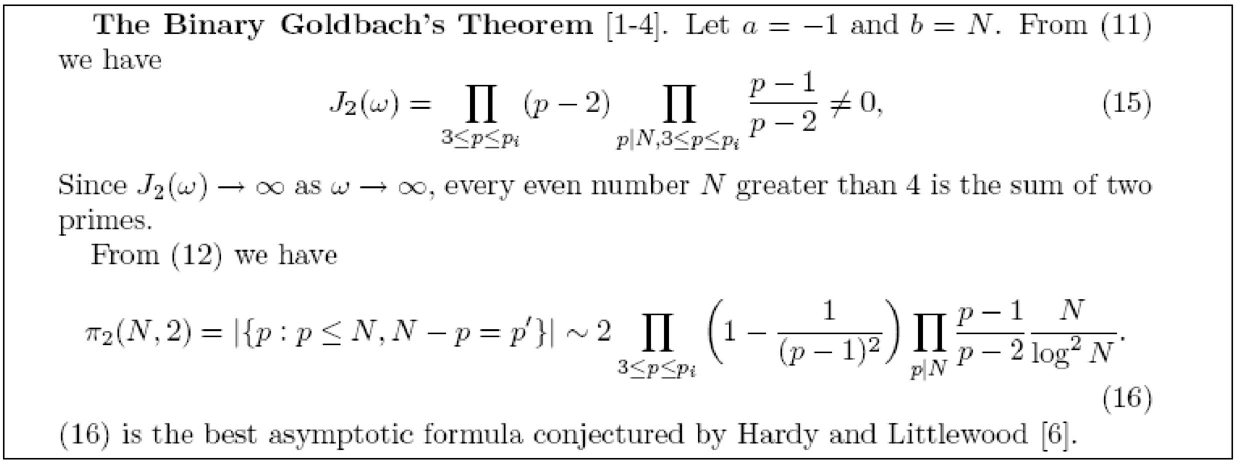
Since $J_2(\omega) \to \infty$ as $\omega \to \infty$, there exist the infinitely many primes p such that $p+2$ is also a prime.

From (12) we have

$$\pi_2(N,2) = |\{p : p \le N, p+2 = p'\}| \sim 2 \prod_{3 \le p \le p_i} \left(1 - \frac{1}{(p-1)^2}\right) \frac{N}{\log^2 N}. \tag{14}$$

(14) is the best asymptotic formula conjectured by Hardy and Littlewood [6].

The second one is taken “binary” and always such simple



The Binary Goldbach's Theorem [1-4]. Let $a = -1$ and $b = N$. From (11) we have

$$J_2(\omega) = \prod_{3 \le p \le p_i} (p-2) \prod_{p|N, 3 \le p \le p_i} \frac{p-1}{p-2} \ne 0, \tag{15}$$

Since $J_2(\omega) \to \infty$ as $\omega \to \infty$, every even number N greater than 4 is the sum of two primes.

From (12) we have

$$\pi_2(N,2) = |\{p : p \le N, N-p = p'\}| \sim 2 \prod_{3 \le p \le p_i} \left(1 - \frac{1}{(p-1)^2}\right) \prod_{p|N} \frac{p-1}{p-2} \frac{N}{\log^2 N}. \tag{16}$$

(16) is the best asymptotic formula conjectured by Hardy and Littlewood [6].

At the beginning of 2008, Jiang contacted the great british number theorist Martin Huxley, who is to the best knowledge the first in the top academic institutes to become interested in Jiang’s works.

Huxley then told Jiang [17] :

> “To say that someone else's work is actually wrong, you have to be extremely certain that your own calculations are correct, and that you have actually read and and understood their work.
>
> (…)
>
> If you have got a new method, the Jiang Function, which solves the famous problems, then bring it into the open and write a full explanation and send it to a Mathematics journal, Annals of Maths or the Proceedings of the London Math. Soc. or the Duke Math. Journal or suchlike. If it works, then most people will be happy to forget about the Riemann Hypothesis completely and use your method instead. If you don't explain your method, then everybody else is entitled to be as rude about you as you are about them, or what is even worse, to ignore you completely., which is what I myself am likely to do, as I am sent more papers than I have time to study anyway.”

Objection to JNT :

1. The Riemann Hypothesis might be true : Balan’s objection [5] :

Had we $\frac{1}{2} \leq s_0 \leq 1$ and $\zeta\left(s_0\right) = 0$, then by recalling the so-called prime zeta function:

$$\zeta_p(s) := \sum_p \frac{1}{p^s}$$

one would have $\zeta_p{}'\left(s_0\right) = \infty$ because of the well-known identity bridging the zeta function to the prime zeta function:

$$\zeta_p(s) = \sum_{n=1}^{\infty} \frac{\mu(n)}{n} \ln\left(\zeta\left(ns\right)\right)$$

and then

$$\frac{\zeta'\left(\frac{s_0}{2}\right)}{\zeta\left(\frac{s_0}{2}\right)} = \zeta_p{}'\left(\frac{s_0}{2}\right) + \zeta_p{}'\left(s_0\right) + \ldots$$

and

$$\frac{\beta'\left(\frac{s_0}{2}\right)}{\beta\left(\frac{s_0}{2}\right)} = -\zeta_p{}'\left(\frac{s_0}{2}\right) + \zeta_p{}'\left(s_0\right) + \ldots$$

The first equality seems to show that $\zeta_p{}'\left(\frac{s_0}{2}\right) = \infty$ by a “recurrence” (in Balan’s own words) supposition that the zeros of the zeta function lie on the critical line when $\mathrm{Im}\left(s\right) \prec \mathrm{Im}\left(s_0\right)$.

Then it is found in [5] that

$$\beta\left(\frac{s_0}{2}\right)=0 \Rightarrow \beta(s) \neq \frac{\zeta(2s)}{\zeta(s)}$$

This is absurd. Balan thus claims

$$\beta\left(\frac{s_0}{2}\right)=\frac{\zeta\left(s_0\right)}{\zeta\left(\frac{s_0}{2}\right)}=0$$

“RH IS TRUE”. [5]

Finally, according to Balan in [5] he is able to set a generalization of the functional equation for the zeta function:

$$\Gamma_\pi(s)\sum_{n=1}^{\infty}\frac{1}{\left(n^2+an\right)^s}=\Gamma_\pi\left(\frac{1}{2}-s\right)\sum_{k=1}^{\infty}\frac{\cos\left(\pi ka\right)}{k^{1-2s}}$$

2. The Jiang function is probably not the most useful and intuitive generalization of Euler’s totient function.

One has on the other side Jordan’s totient function (references are found in [18]) :

$$J_k := n^k \prod_{p/n}\frac{1}{1-\frac{1}{p^k}}$$

where interestingly by defining

$$\overset{=}{J}_k(n) := \frac{J_k}{n^k}$$

one clearly sees that $\overset{=}{J}_k(n) \to \zeta(k)$ as $n \to \infty$ if on

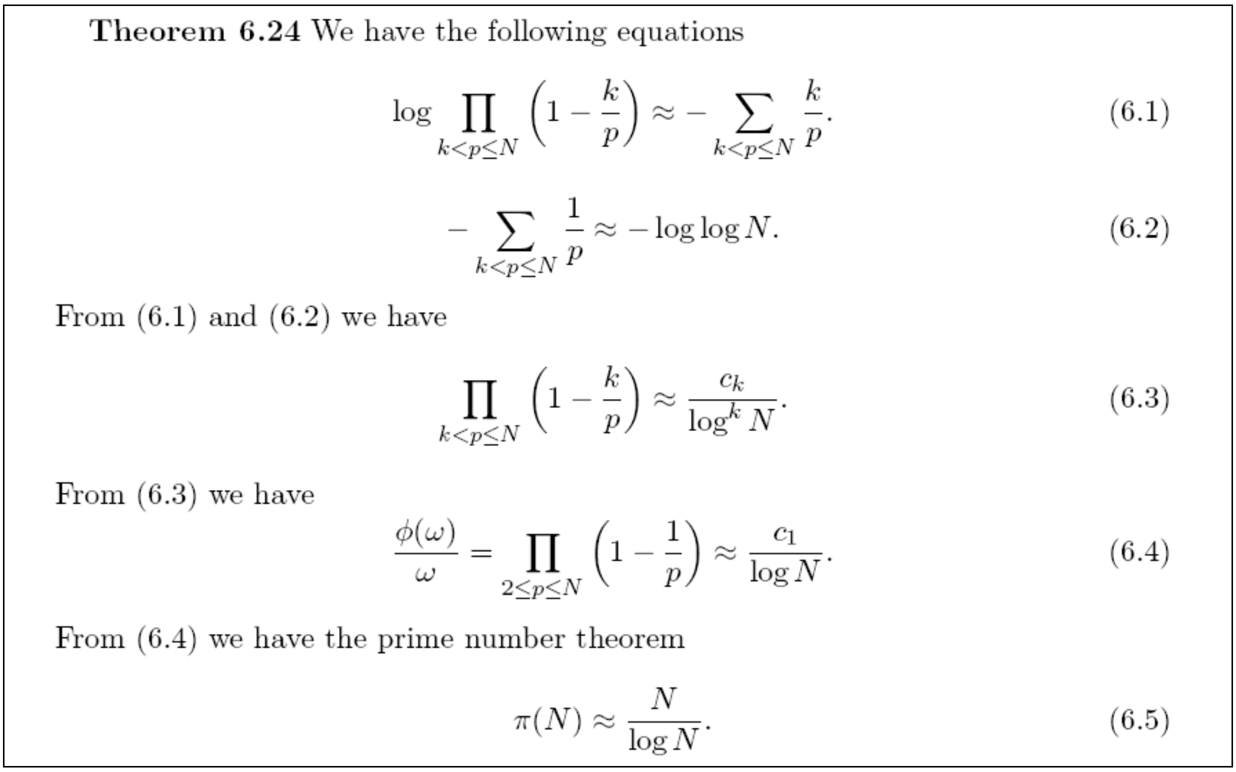
Reply to the objections :

1. Had RH be true, JNT would have not been disproved, because Jiang’s claims that RH is not true is not taken as a foundation of JNT but only as a *motivation* and an urgent reason to see further.

And moreover Balan’s proof is much less intuitive that Jiang’s. The calculations of the nontrivial zeros of the zeta function, being improved, would not contradict JNT fundamentally.

2. However Jordan’s function is interestingly intuitively identified to the zeta function for greater and greater values, and a bridging between the zeta function and the Jiang function has to be shown in the future. But this definition, seems to us to be the expression of Euler’s totient function the nearest to the Jiang function. The Jiang function remains the most useful tool to prove the Twin Prime Conjecture and the k-tuple conjecture, just as Jiang gives a proof of the Prime Number Theorem using Euler’s totient function in [3]:

Following it we are able to set the Jordan’s totient function as a quest to the Jiang function which has direct applications in improving the k-tuple Conjectures.



Theorem 6.24 We have the following equations

$$\log \prod_{k<p\leq N}\left(1-\frac{k}{p}\right) \approx -\sum_{k<p\leq N}\frac{k}{p}. \tag{6.1}$$

$$-\sum_{k<p\leq N}\frac{1}{p} \approx -\log\log N. \tag{6.2}$$

From (6.1) and (6.2) we have

$$\prod_{k<p\leq N}\left(1-\frac{k}{p}\right) \approx \frac{c_k}{\log^k N}. \tag{6.3}$$

From (6.3) we have

$$\frac{\phi(\omega)}{\omega} = \prod_{2\leq p\leq N}\left(1-\frac{1}{p}\right) \approx \frac{c_1}{\log N}. \tag{6.4}$$

From (6.4) we have the prime number theorem

$$\pi(N) \approx \frac{N}{\log N}. \tag{6.5}$$

In the hope that Jiang’s work, which, even if it is false, constitutes a formidable attempt to raise the largest number of deepest number theoretic problems, will receive an echo into the circles of mathematicians, the author would concludes his course on Jiang’s works by a list of challenges for the future.

2) Challenges for the future:

1. To extend Jiang’s foundations of Santilli’s isonumber theory to genomathematics and hypermathematics [12]

2. To establish the number theoretical foundations of informatics through computability theory which seems implicitly connected to the isotopic formalism found in [12]

3. To discover the exact and complete order behind the distribution of primes, Snatilli isoprimes, Santilli genoprimes, Santilli hyperprimes and their respective isoduals.

4. Hypernumbers = sequences of ordinary numbers

sequences of bits = programs

what about infinite sequences? What about Number theoretic aspect of the building of computer programs? What is infinity and what are thoughts that are compressed into programs? What is the link between programming and LIFE (since, as seen in [3] and [12] hypermathematics has been built to represent consistently biological systems)

5. To extend informatics to Hadronic Mathematics to which the best introduction seems to the author to be found in Santilli’s latest work as in 2008 [12] with related softwares, programs and programming.

6. To extend the formal definition of pattern distastefully evoked in this paper to all mathematical concepts and/or structures.

To concentrate all upcoming ideas useful to solve these problems the author is trying to generalize Information Theory into *Hadronic Information Theory* (HIT) with an appropriate hypermathematical formalism and number theoretic foundations.

The author would define for instance HIT as the *semantic embedding of Hypernumber Theory* thus needing the rigorous establishment as recalled in the *Challenges* above of the new *Santilli Hypernumber Theory (SHT)* just as the Jiang Santilli isonumber theory in which Jiang Number Theory (the great JNT) has its kingdom.

A series of papers is to appear about HIT, following [15] and [16], in which information will be understood as programs which are themselves understood as sequences of numbers which themselves appear to be Santilli hypernumbers. But the establishment of Santilli's Hypernumber Theory should take a long time.

The starting definition from SHT to HIT will be the definition of PATTERN.

We have seen in [12] that the pattern for isomathematics is the Santilli isounit and the pattern for Jiang function is Euler totient function.

IS JIANG FUNCTION $J_n(p\#) := \prod_{3\le p\le p_i}\left(\frac{(p-1)^n-(-1)^n}{p}\right)\prod_{p/N}\left(1+\frac{(-1)^n p}{(p-1)^n-(-1)^n}\right)$ THE UNIVERSAL PATTERN FOR **SHT** AND **HIT** ?

Further improvements of JNT are needed to set this rigorously. To the best knowledge of the author, the greatest steps done for instance to define patterns of mathematical theories and the Universe as a music of particles or a system are found in Johansen [8] and Rowlands [14].

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Laurent Schadeck.

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