The Theory of Self-Avoiding Walks is Only %66.81 Mathematical (According to the Appel Test)

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In a recent tour-de-force, Andrew Appel[A] proposed the soon-to-be-famous *Appel Factor* for determining the mathematical content of an area. In a given collection of papers submitted to a conference in that area, let a_k be the number of k-author papers where the authors' names are listed alphabetically, and b_k be the number of papers where the order is not alphabetical. He defined

$$L(p) := \prod_k \left((1-p) + \frac{p}{k!} \right)^{a_k} \left(p - \frac{p}{k!} \right)^{b_k} \binom{a_k + b_k}{a_k} \quad ,$$

and defined p_{max} to be the value of p ($0 \leq p \leq 1$) maximizing $L(p)$. His rationale was that, mathematicians and other theoreticians, being intrinsically nicer and less competitive than their applied and experimental counterparts, have the habit of listing the authors' names alphabetically, while scientists have a pecking order. Hence if there were a fraction of p scientists and $1-p$ mathematicians, then $L(p)$ is the probability of the observed distribution. By maximizing $L(p)$, we find the p that was most likely to produce the observed data.

Like most great discoveries, the discoverer did not realize the full scope of his invention. Appel only applied his test to conference proceedings (in computer science). However, the bibliography of any interdisciplinary book provides ideal grist for the Appel mill. One such area is that of 'Self-Avoiding-Walks', and the references in the modern classic [MS] supply authentic data. By direct counting we found $a_2 = 76$, $b_2 = 19$; $a_3 = 22$, $b_3 = 1$; $a_4 = 1$, $b_4 = 4$. Hence $p_{max} = .3319075633$.
$\square$

P.S. A small Maple package, `appel`, implementing the Appel test, is available from the author's website.

REFERENCES

[A] Andrew W. Appel, *Is POPL Mathematics or Science?*, ACM SIGPLAN Notices **27**(4), 87-89, April 1992. `http://www.cs.princeton.edu/~appel/papers/science.ps`.

[MS] N. Madras and G. Slade, *" The Self Avoiding Walk"*, Birkhauser, 1993.

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`http://www.math.temple.edu/~ekhad`. May 11, 1997.