Noesis

The Journal of the Noetic Society

(Issue #16, July 1987)

Editorial

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New Admission Cut-off: Several members have expressed the view that it would be a good idea to reduce the Society's admission cut-off from a raw score of 43 to one of 42 on the Mega Test, since Omni magazine (April 1985) specified 42 as the cut-off for the Mega Society. It soon became apparent that 42 was too low a cut-off for that society. I founded the Titan Society for those who had scored 43 or better on the Mega Test, thinking that this was about the one-in-100,000 level. My fourth norming of the Mega Test, published in issue #14 of this journal, puts the cut off for the Mega Society, the one-in-a-million level, at a raw score of 45, while 43 appears now to correspond to the one-in-300,000 level. I see no harm, therefore, in reducing our cut-off to 42, which appears to be about the one-in-225,000 level.

The following nine persons are therefore eligible to join this group. I include here one person who recently scored 46 on the Mega Test plus eight who scored 42. Two or three of our current thirteen members actually scored 42 on their first attempts at the Mega Test, incidentally. Those who wish to join should send me $5 to cover dues for the remainder of 1987.

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Renaming This Journal and Society: The poll results reported in issue #11, page 4, indicated that members preferred to call this society the Noetic Society rather than the Titan Society or any of a wide range of other suggested names. I have finally decided to go along with that preference, and I will accordingly now be calling this journal Noesis rather than Insight. According to the definition given in Webster's Ninth New Collegiate Dictionary, "noetic" means "of, relating to, or based on the intellect," which seems reasonably appropriate for this group.

As for changing the name of this journal, I chose the appellation "noesis" because it is the noun form of "noetic." I also found that "insight" has already been employed as the name of at least two other publications. In New York Newsday, June 23, 1987, Part II, page 3, in a lengthy review of Allan Bloom's bestseller, The Closing of the American Mind, one paragraph reads as follows:

> "In part, the book has been particularly well received in conservative intellectual circles. The editors of Insight Magazine put Bloom on the cover and called the book 'certainly the most important book we have read this year.' The reviewer in The New Criterion called it 'an extraordinarily accurate diagnosis of the current state of American civilization.'"

And in the New York Post, June 30, 1987, page 46, in an article on how to choose a mutual fund, two of the paragraphs read as follows:

> "Right now, he's not recommending Magellan to the 25,000 subscribers of his monthly Insight magazine.
> "'Of the 800,000 shareholders, 100,000 have no business in Magellan,' said Kobren, a former marketing executive at Fidelity."

Letter to the Editor

Anthony J. Bruni
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I began reading your dissertation, and noticed that some of the pages were photocopied correctly. Would you be so kind as to send me the following three pages: 15, 16, and 239?

In the meantime, I'm still trying to adjust to my new circumstances which resulted from a divorce and job termination. In a year or so, I hope to have my personal life in order, and then I can take a more active role in the Titan Society.

Editor's comment: I promised once to the members, I believe, to offer an abstract of my dissertation in this journal, but I never got around to it, so I offer it below. The dissertation is better than the abstract, I think. Any member who wants a copy of the dissertation should send me $20 for printing and postage.

When I started to type the foregoing note from Mr. Bruni, I had forgotten his mention of a divorce, which perhaps it might not be entirely proper for me to report to the membership. But speaking for myself, I'd rather have loved and lost than never to have loved at all, as the saying goes. I'm 43 years old and have never been married, whereas one of our members, Marilyn vos Savant, is launching her third ship of matrimony on August 23, which makes me feel somewhat retarded in my own social development.

Dissertation Abstract

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Title: The Root-Metaphor Theory: A Critical Appraisal of Stephen C. Pepper's Theory of Metaphysics Through an Analysis of Its Interpretation of the Concepts of Truth, Beauty, and Goodness.

An attempt is made to show how several major theories of truth, beauty, and goodness and the metaphysical systems that generate them can be harmoniously integrated within a single theory. The root-metaphor theory of Stephen C. Pepper serves as the main guide in this endeavor in view of its clear and comprehensive survey of the concepts and theories involved.

Eight of Pepper's books are examined for the light they can shed on the problem being investigated. These are as follows: for theories of truth, World Hypotheses and Concept and Quality; for theories of beauty, The Basis of Criticism in the Arts, supplemented by Aesthetic Quality, Principles of Art Appreciation, and The Work of Art; and for theories of goodness, The Sources of Value and Ethics. These are supplemented by references to the writings of other philosophers whose views appear to epitomize the perspectives cited by Pepper.

The five fundamental metaphysical systems in terms of which Pepper examines the concepts of truth, beauty, and goodness he calls formism, mechanism, contextualism, organicism, and selectivism. Typical proponents of these perspectives who are cited in the present investigation are Plato, Aristotle, and J. L. Austin for formism; J. S. Mill, Santayana, and David Prall for mechanism; William James and John Dewey for contextualism; and Royce, Bosanquet, and Plato for organicism. Selectivism is Pepper's own theory, although he cites Whitehead as a possible forerunner.

I contend that each of these metaphysical systems has a distinctive perspective on every issue, that of formism being aesthetic, that of mechanism inductive, that of contextualism ethical, that of organicism deductive, and that of selectivism epistemological. I show how each of these perspectives emerges from an analysis of the structure of a purposive act, the root metaphor of selectivism. I call this modified version of selectivism neoselectivism.

Trial Test "E"

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This is the fifth test in this series. Try to finish this test within a month or so, but if you need a bit more time, your answers may still be of value.

The scoring fee for Triple Nine and Titan members is $5.00, but as usual this fee will be waived for those who consider it a hardship. For non-members the fee is $6.00, or $25.00 for the entire series of six tests. I now anticipate that I will need at least one more test to complete the two final multiple choice tests, so the six tests that I initially projected will not be cut short. Make checks payable to "Ronald K. Hoeflin."

I currently have over 70 responses to Trial Test "A", about 40 to Trial Test "B", and 20 to Trial Test "C". I need at least 20 responses per test in order to evaluate the adequacy of the problems.

Verbal Analogies

For the following 18 problems, write the first letter of the word or phrase that best completes the analogy. For example, in the analogy DAY : NIGHT :: WHITE : ? the best answer would be BLACK, so you would write the letter "B" for "Black" on your answer sheet. Use reference aids.

1. SWORD : DAMOCLES :: BED : ?
2. THING : DANGEROUS :: SPRING : ?
3. HUE : CRY :: JOT : ?
4. CATCH-22 SITUATION : HELLER :: SOUR-GRAPES ATTITUDE : ?
5. VICTORY, 279 B.D. : PYRRHIC :: VILLAGE, 1787 A.D. : ?
6. LANGUAGE GAME : LUDWIG :: PIANO CONCERTI FOR THE LEFT HAND : ?
7. PILLAR : OBELISK :: MONSTER : ?
8. GOOD : EVIL :: ELOI : ?
9. PASSIONATE OUTCRY : CRI DE COEUR :: LATEST FASHION : ?
10. CONCLUSION : EPILOGUE :: MORAL FABLE : ?
11. ABSOLUTELY CERTAIN : APODEICTIC :: INTENDED MAINLY FOR RHETORICAL EFFECT : ?
12. ONE : SINGULAR :: RING : ? (Find another answer than "Annular")

Non-Verbal Problems

Suppose you can perform three actions with two or more bottles of water: (1) fill one bottle to the top with water from a faucet, (2) transfer water from one bottle to another, stopping only when the other can is full or when the first one is empty, and (3) completely empty any can by pouring its contents down a drain. For each of the following sizes of bottles, determine the minimum number of these actions sufficient to arrive at the desired goal for some one of the bottles:

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13. Given bottles that contain 42, 19, and 7 gallons, respectively, how many movements are necessary to arrive at 36 gallons in the largest bottle.

14. Given bottles that contain 50, 27, and 7 gallons, respectively, how many movements are necessary to arrive at 38 gallons in the largest bottle.

15. Given bottles that contain 25 and 23 gallons, respectively, how many movements are necessary to arrive at 1 gallon in either bottle.

Assume that an ant starts at the vertex of a polyhedron and crawls along the edges of that polyhedron at a rate of one edge per minute. At each vertex to which the ant comes, it has an equal chance of traveling along any of the edges that meet at that vertex, except that it never reverses direction and travels back along an edge that it has just traversed. (It may, however, traverse that edge at a later time in either direction.) What is the probability to the nearest percent that the and will end up at the vertex from which it started after 100 minutes for each of the following polyhedra:

16. Tetrahedron.

18. Dodecahedron.

17. Octahedron.

19. Icosahedron.

The number of vertices, edges, faces, volumes, and hypervolumes for each of the following geometrical figures is shown in tabular form. Determine the missing numbers.

	vertices	edges	faces	volumes	hypervolumes
point	1	0	0	0	0
line	2	1	0	0	0
square	4	4	1	0	0
cube	8	12	6	1	0
4-dimensional hypercube	(?)	(?)	(?)	(?)	1

20. The number of <u>vertices</u> for a 4-dimensional hypercube is what?

21. The number of <u>edges</u> is what?

22. The number of <u>faces</u> is what?

23. The number of <u>volumes</u> is what?

24. Suppose that each face of a 4-dimensional hypercube is painted either black of white. How many distinct color patterns are possible? Do not count as different patterns any two patterns that can be transformed into one another by a rigid rotation of the entire hypercube. Do count all sides of the hypercube in each pattern as if the entire hypercube could be visualized simultaneously.

END OF TEST

(Editor's note: I first heard of Ramanujan only 3 or 4 years ago, so I reproduce this recent article from the New York Times for the benefit of those members who never heard of him. I would also like to know if any member can clarify for me the meaning of the subscript n's (five of them) immediately to the right of the sigma sign in the formula for pi on the following page. The formula itself is so astonishing that one wonders how Ramanujan ever thought of it.)

THE NEW YORK TIMES, TUESDAY, JULY 14, 1987

An Isolated Genius Is Given His Due

Mathematician who died at 32 is now revered as a major theorist.

By JAMES GLEICK

IN some ways, mathematicians are finally beginning to penetrate the mind of Srinivasa Ramanujan.

One hundred years have passed since Ramanujan was born in the small city of Kumbakonam in southern India. When he died 32 years later, he left a strange, raw legacy, about 4,000 formulas written on the pages of three notebooks and some scrap paper.

Some of the power and originality of Ramanujan's mathematics was understood a few years before his death. His contemporaries saw from the theorems scrawled across his pages that he possessed a genius for calculating the hidden laws and relationships that govern the wilderness of numbers.

But Ramanujan was uneducated in standard mathematics and isolated by geography for most of his productive life. Often his formulas seemed as obscure as they were elegant. He worked in a place of his own and a way of his own, drawing his formulas and theorems from a mental landscape that remained far from the frontier of mathematics as it was seen in his day.

Now his work is flowing into mathematics and science more deeply than could have been imagined a generation ago. Computers, with special programs to manipulate algebraic quantities, have made it possible for more ordinary mathematicians to pick up the trail of his thought. And modern physics, from the superstring theory of cosmology to the statistical mechanics of complicated molecular systems, finds itself turning more and more often to the pure findings of number theory and complex analysis — the worlds of Ramanujan.

So researchers are intensifying a process of forensic mathematics, or mathematical archeology — poring over the rough pages, trying to understand the formulas and prove them. As they learn more of why Ramanujan chose particular paths, they sense a foundation that has not yet been revealed.

"When he pulled extraordinary objects out

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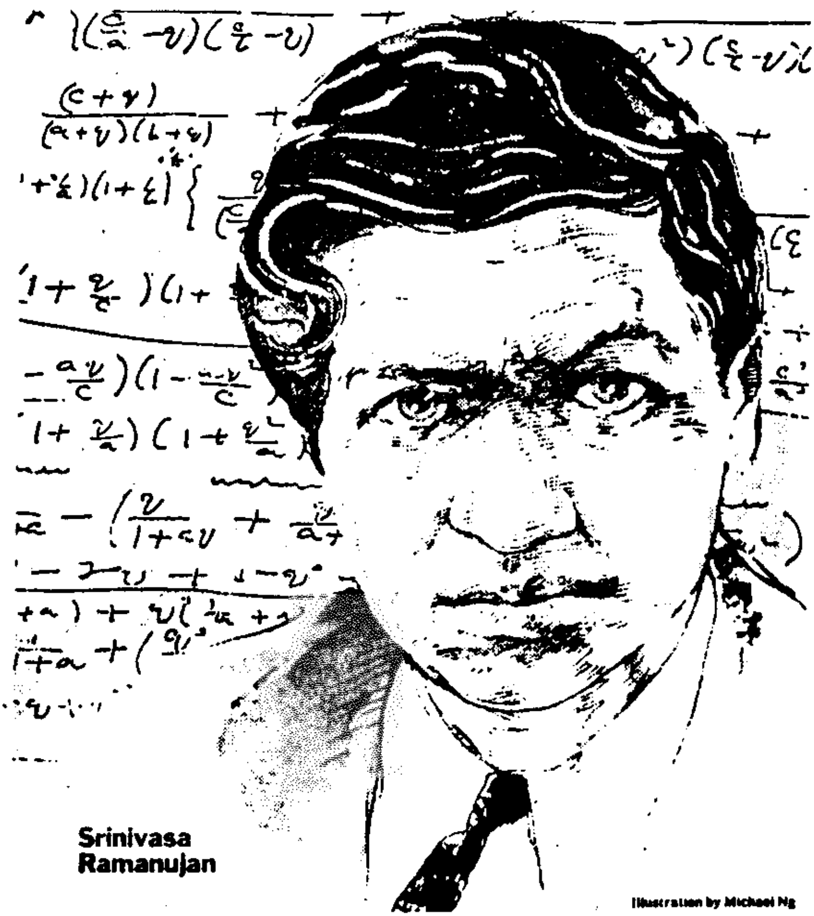
of the air, they weren't just curiosities but they were the *right* things," said Jonathan M. Borwein of Dalhousie University in Halifax, Nova Scotia, one of many mathematicians who has lately found himself turning to Ramanujan's formulas. "They are elusive evidence of a theory that's lurking around somewhere that he never made explicit."

The trail is hard to follow. Out of necessity and then perhaps out of habit, Ramanujan worked in a style that



Srinivasa Ramanujan

Illustration by Michael Ng

A Mysterious Formula for Pi

$$\frac{1}{\pi} = 2\sqrt{2}\sum_{n=0}^{\infty}\frac{(\frac{1}{4})_n(\frac{1}{2})_n(\frac{3}{4})_n}{(1)_n(1)_n n!}(1103 + 26390n)(\frac{1}{99})^{4n+2}$$

Mathematicians find many of Ramanujan's formulas to be both beautiful and obscure. To their surprise, the formula above provides an extremely rapid way to calculate the value of pi, an age-old preoccupation. Only last year, a computer scientist used a version of Ramanujan's formula to calculate pi to 17 million places. Only after this success were mathematicians able to prove why Ramanujan's insight was correct.

awes and frustrates modern mathematicians. He used a slate, jotting down formulas, erasing them with his elbow, jotting down more, and then recording a result in his precious notebook only when it had reached final form.

The intermediate results, the links of the chain, are lost. Unlike mainstream mathematicians, he felt no need to prove that a result was true. His legacy is simply a set of discoveries.

'A Feel for Things'

"He seems to have functioned in a way unlike anybody else we know of," Dr. Borwein said. "He had such a feel for things that they just flowed out of his brain. Perhaps he didn't see them in any way that's translatable. It's like watching somebody at a feast you haven't been invited to."

So mathematicians have spent years — often valuable and productive years — proving theorems that Ramanujan knew to be true. Deriving the formulas has often been more illuminating than the formulas themselves. Whole new subdisciplines within mathematics have blossomed around ideas that Ramanujan put forward in a peculiar, stark isolation.

'He seems to have functioned in a way unlike anybody else.'

With the special excuse of his centennial year, mathematicians are gathering to discuss the implications of Ramanujan's work at meetings in the United States and India. They have far more raw material to work with than ever before, because the last decade has brought a new effort to find and organize the pages that make up his legacy.

A University of Illinois mathematician, Bruce Berndt, has spent years editing the notebooks, tracking down sources and relationships and, above all, proving as many of the unproved theorems as possible. A mathematician at Pennsylvania State University, George Andrews, has been performing the same task with the so-called Lost Notebook, 130 pages of scrap paper from the last year of Ramanujan's life.

"The work of that one year, while he was dying, was the equivalent of a lifetime of work for a very great mathematician," said Richard Askey of the University of Wisconsin, who has collaborated with Dr. Andrews in trying to understand some of Ramanujan's work.

"What he accomplished was unbelievable," Dr. Askey said. "If it were in a novel, nobody would believe it."

Ramanujan (rah-MAH-nuh-jun) might have died in complete obscurity if he had not written a series of desperate, bold letters to English mathematicians in 1912 and 1913. By then he was 25 years old, working as a £30-a-year clerk after several years of unemployment, unwilling to put aside his slate and formulas.

His family was Hindu, high-caste, but poor. His father and grandfather before him worked as clerks for cloth merchants. Ramanujan was lucky enough to have a fairly good high school education in Kumbakonam, and he began his creative exploration of mathematics after discovering the few outdated and second-rank textbooks in the library there.

His intellect stood out clearly, but in college at Madras, about 150 miles north of his birthplace, he failed again and again to pass examinations in other subjects. In mathematics itself, he had no teacher. He worked, as the English mathematician Godfrey J. Hardy later said, "In practically complete ignorance of modern European mathematics."

Hardy was not the first mathematician to receive a letter from this "unknown Hindu clerk," as he recalled — "at the best, a half-educated Indian." But he was the first to understand what the letter contained.

Ramanujan's letters said, in effect, *I know the following ... and I also know this ... and, by the way, I have discovered this.* He offered a carefully chosen selection of his theorems. Most were in the form of identities — statements that some familiar quantity, like pi, was equal to some unfamiliar quantity, or that two unfamiliar quantities were equal.

Hardy examined them with bewilderment. A few struck chords of recognition, he said later; he thought he had proved similar statements himself. Some he thought he could prove if he tried — and he succeeded, although with surprising difficulty.

Other theorems were already known. Still others, however, "defeated me completely," Hardy said in an essay years later.

Journey to Cambridge

"I had never seen anything in the least like them before," he said. "A single look at them is enough to show that they could only be written down by a mathematician of the highest class. They must be true because, if they were not true, no one would have had the imagination to invent them."

Furthermore, Hardy could tell that Ramanujan was holding some things back, offering specific examples of theorems for which he surely must have discovered more general versions. He arranged an invitation to Cambridge University, and in 1913 Ramanujan arrived, leaving his wife behind. He stayed for nearly six years.

The two men collaborated often. Hardy remembered a slight man, of medium height, with eyes through which some light seemed to shine. Ramanujan remained a strict vegetarian, cooking all his own food in his rooms, and when he fell mysteriously ill in 1917, Hardy thought his vegetarianism contributed to his failing health.

Years later, Hardy took some pains to dispel the idea, perhaps a byproduct of subtle English racism, that Ramanujan was some sort of Asian curiosity — either an "inspired idiot" or "some mysterious manifestation of the immemorial wisdom of the East." On the contrary, in Hardy's eyes he was a deliberate rationalist, often shrewd, and not nearly so religious as his dietary habits made him appear.

They shared a fascination with numbers as almost living things, or characters in a story. They thought about round numbers, defined as numbers with only small factors, like 300, $2^2 \times 3 \times 5^2$. They worked on the question of how common such numbers are, in strict mathematical terms, and on many problems more difficult to put into words.

One day after Ramanujan fell ill, Hardy visited him in a taxicab and remarked that the cab's number had been rather uninteresting — 1729, or 7×13×19. "No, it is a very interesting number," Ramanujan responded, as Hardy later told the story. "It is the smallest number expressible as a sum of two cubes in two different ways." (It is the sum of 1×1×1 and 12×12×12, and it is also the sum of 9×9×9 and 10×10×10.)

Hardy understood and appreciated Ramanujan more than any of his contemporaries. But even he could not see beyond the blinkers of his time and place. To him, Ramanujan's story was ultimately a tragedy — of inadequate education and of genius unguided. When he finally came to assess the younger mathematician's work and its likely influence on the future of his subject, he expressed disappointment.

"It has not the simplicity and the inevitableness of the very greatest work," Hardy wrote in 1927. "It would be greater if it were less strange."

Few mathematicians accept that assessment today, as strangeness comes into the light and Hardy recedes into Ramanujan's greater shadow.

"Hardy thought it was a shame that Ramanujan wasn't born a hundred years earlier," Dr. Askey said. That was the great age of formulas, the era of ground-laying work by such mathematicians as Euler and Gauss. "My comment is that it's a shame

'The work of that one year was the equivalent of a lifetime.'

Ramanujan wasn't born a hundred years later," he said. "We're trying to do problems in several variables now — the problems are harder, and it would be marvelous to have somebody with his intuition to help get started."

Not that his intuition was infallible. Ramanujan made some errors, once claiming to have found a formula for the approximate number of primes less than any given number. No such formula exists. He was too optimistic, and it was the optimism of an earlier time; by the 19th century, mathematicians had learned that some problems could never be solved, but Ramanujan's isolation shielded him from their doubts as much as from their knowledge.

In 1919, increasingly ill, having entered and left a nursing home and several sanitariums, Ramanujan returned to India. He continued to work feverishly, fighting the pain of his mysterious ailment, writing on whatever paper he could find. The next April, at the age of 32, he died.

Papers Discovered in 1976

The work of his last year, 130 unlabeled pages, came to rest at the library of Trinity College, Cambridge, where they lay in a box, along with assorted bills and letters, until Dr. Andrews of Pennsylvania State University found them in 1976. This was the Lost Notebook.

"It's a bizarre term to use for something that was in the major library of the major college in England," Dr. Borwein said, "but in terms of people appreciating its contents, it was certainly true."

Dr. Andrews found that Ramanujan had cleared a path that mathematicians had not succeeded in matching in the intervening half century. Many discoveries concerned a family of identities he called mock theta functions — "simple assertions in arithmetic," as Dr. Andrews put it, although "their implications are quite profound."

Such mathematics has helped drive one of the major new conceptions of theoretical physics, superstring theory, as the physicist Freeman Dyson told a Ramanujan conference last month. "As pure mathematics, it is as beautiful as any of the other flowers that grew from seeds that ripened in Ramanujan's garden," he said.

Another identity was used last year to enable a computer to calculate millions of digits of pi. It converges on the exact value with far greater efficiency than any previous method. Yet, as always, Ramanujan had merely asserted his discovery; only later did Dr. Borwein and his brother, Peter B. Borwein, prove rigorously that those millions of digits really were pi.

The applications of Ramanujan's magical-seeming formulas make mathematicians think that he was mining a deep vein of theory, the full outlines of which are not yet known. But many prefer not to dwell on just how Ramanujan was able to think as he did.

Hardy looked at Ramanujan's origins and saw a crippling neglect by an inadequate educational system cut off from European society. Still, as mathematicians realize now, Ramanujan had a decent high school, a handful of books and the traditions of a culture that allowed him to aspire to a life as a scholar.

Those looking for lessons in his brief, rich life sometimes note that now, one century later, much of the planet lacks that much.

"Ramanujan is important not just as a mathematician but because of what he tells us that the human mind can do," Dr. Askey said. "Someone with his ability is so rare and so precious that we can't afford to lose them. A genius can arise anywhere in the world."

About the Editor

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I was born February 23, 1944, in Richmond Heights, Missouri, just outside the city limits of St. Louis. My father was an electrical engineer whose parents emigrated to the U.S.A. in the 1890's, his father coming from the Baden region of Germany and his mother from the Zurich region of Switzerland. My mother was an opera singer (in such roles as Tosca and Aida) whose ancestors originated from England, Scotland, and possibly Ireland, too. At least one of her ancestors arrived in this country in the 1740's. She grew up in Georgia, the daughter of an itinerant Methodist preacher.

My parents were divorced when I was five. At eight I had an eye operation for detached retina. My visual acuity is now 10/60 in the better eye with glasses. I read using bifocals plus a small magnifier.

I have attended seven colleges and universities: Caltech, Shimer College, the University of California at Berkeley, the University of Minnesota in Minneapolis, Indiana University in Bloomington, the University of North Carolina in Chapel Hill, and the New School for Social Research here in New York City. I have two bachelors degrees (from Shimer and Minnesota), two masters degrees (from Indiana and the New School), and one doctorate (from the New School), the latter degree being in the field of philosophy, completed in May of this year (1987).

I have been a member of all six high-IQ societies listed in the Encyclopedia of Associations: Mensa, Intertel, the International Society for Philosophical Enquiry, the Triple Nine Society, the Prometheus Society, and the Mega Society--but I currently belong to only three of these: Mensa, Triple Nine, and Prometheus. I am the founder of Prometheus and of the Noetic Society (formerly called the Titan Society). I consider myself the founder of the Mega Society, although some argue that Chris Harding has at least equal claim th that status. I am also a co-founder of the Triple Nine Society. Thus, I have been at least partly responsible for the establishment of four of the seven currently active high-IQ societies.

My chief hobbies are editing journals for the Triple Nine and Noetic societies and designing and scoring IQ tests for admission to these various societies. I was a professional librarian for fifteen years, but ten of these were part-time. I currently support myself chiefly by editing the Triple Nine journal, from which I can make about $375 per month. I also made about $30,000 from the appearance of my Mega Test in the April 1985 issue of Omni magazine. The Mega Test is accepted as an admissions test by all high-IQ societies except Mensa and Intertel. My other interests include classical music and sci-fi.

I am currently preparing a new IQ test for possible publication in Omni, and I hope to use that occasion, if it occurs, to launch my own independent high-IQ journal, to be titled either In-Genius or The Generalist, in order to free myself from dependence on the whims of the Triple Nine Society's Executive Committee or any other employer.

The Editor (January 1981)