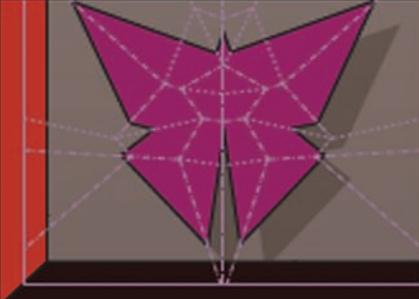
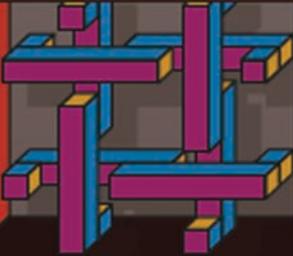


TRIBUTE TO A

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EDITED BY



BARRY CIPRA  
ERIK D. DEMAINE  
MARTIN L. DEMAINE  
& TOM RODGERS

Tribute  
to a  
Mathemagician



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# Tribute to a Mathemagician

Edited by

Barry Cipra  
Erik D. Demaine  
Martin L. Demaine  
Tom Rodgers



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# Preface

This book is the third in a series devoted to Martin Gardner. Each book is a collection of articles written by a handful of the many mathematicians, puzzlers, and magicians that Gardner inspired. Most of these articles were presented at the *Gathering for Gardner (G4G)* meetings, a regular gathering of enthusiasts who share some of Gardner's many interests. This volume draws on the many excellent presentations at the last such meeting, G4G5, held in Atlanta on April 5–7, 2004. The previous volume in the series, *Puzzlers' Tribute: A Feast for the Mind* (2002), is based on three of the Gatherings—G4G2, G4G3, and G4G4. The first volume, *The Mathematician and Pied Puzzler* (1999), is based on the first Gathering, G4G1. At the back of this book, you will find an index to all three books in the series.

One of the running traditions of the Gatherings is to have a theme related to the number of the conference. The theme for G4G5 was “penta”—Greek for the number five, as in “pentagon” and “pentagram.” This theme shows up in several of the articles in this book.

Martin Gardner is the father of recreational mathematics, an avid puzzler, a life-long magician, and a debunker of pseudoscience. He has written more than 65 books throughout science, mathematics, philosophy, literature, and conjuring. He has deeply influenced countless readers of his “Mathematical Games” column in *Scientific American*, which ran for 25 years from 1957 to 1982. This column popularized recreational mathematics, and introduced many connections between mathematics, puzzles, and magic. Together with Gardner's amazing ability to connect with his many readers, the columns gave the general public the opportunity to enjoy mathematics and to participate in mathematical research. Many of today's

mathematicians entered the field because of Gardner's influence. A whole body of research into recreational mathematics has also emerged, solving problems that Gardner posed years ago and introducing new problems in the same spirit.

Although Gardner himself has unfortunately been unable to attend the Gatherings since G4G2, the presentations are video-recorded so that he can watch at home. Gardner's great gift to us was to interconnect so many people and so much beauty in each of his fields of interest. Our gift back to Gardner is to show that the community he built continues to flourish in his honor.

This book also commemorates the memory of two great puzzlers, who were good friends of Gardner. Edward Hordern was a master puzzle solver and a great puzzle collector. Nobuyuki Yoshigahara—affectionately called Nob—was a master puzzle designer who greatly influenced the entire puzzling community. The first four articles in this book recount stories of these two great men.

This book could not have happened without the help of countless people. The organizers of the Gatherings for Gardner—Elwyn Berlekamp, Tom Rodgers, and Mark Setteducati—would like to acknowledge the work of many people who have helped make the Gatherings successful, including Scott Kim, Jeremiah Farrell, Karen Farrell, Emily DeWitt Rodgers, David Singmaster, and many others. The book itself exists thanks only to the efforts of a large group of contributors. Scott Kim conceived of and assembled the first tribute volume, and designed the cover in this third volume and the second. Emily DeWitt Rodgers has done an excellent job of designing and maintaining the [g4g4.com](http://g4g4.com) website, which is devoted to the Gatherings. We also thank a number of anonymous experts for their reviews of papers. Finally, the support of our publisher, A K Peters, Ltd., enabled this project to become the book you now hold in your hands.

All of us feel honored by this opportunity to join together in tribute to the man in whose name we gather, Martin Gardner.

Barry Cipra  
Northfield, Minnesota

Erik D. Demaine  
Cambridge, Massachusetts

Martin L. Demaine  
Cambridge, Massachusetts

Tom Rodgers  
Atlanta, Georgia

# In Memoriam



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# Edward Hordern (1941–2000)

James Dalgety

In half a century Edward Hordern seemed to live several lifetimes worth of diverse activity. Certainly in his last quarter century he managed at least two lifetimes worth of puzzling.

After studying Modern Languages at the Sorbonne, University of Paris, Edward went into accountancy for two years. He then joined a large advertising agency, Alfred Pemberton Ltd and its subsidiary Business Press Bureau Ltd. in 1963. He spent five years with the firm, starting as a trainee and ending up a director. In 1966 he started his own company, Creteco Ltd, manufacturing and selling accessories for concrete. As a side-line to this business, he had twelve trucks doing long distance haulage—the longest trip on one occasion was from England to Bombay. His firm was also the first to import commercial maintenance-free batteries into Europe.

In 1970 Edward took over the running of the family farm at Cane End. The farm consisted of 1,200 acres (500 Hectares) of mixed cereal and beef. He planted 12 acres of vines. In one year of the International Wine and Spirit Competition, his 1986 vintage won a silver medal and his 1987 vintage won a bronze. This was achieved competing against 1100 entries from 30 countries. His wine label not only showed his beautiful 18<sup>th</sup> Century

---

**James Dalgety** Metagrobologist. Ex-Antarctic Weather Observer and Turkey Farmer(1960s). Co-Founder of Pentangle Puzzles (1970s & 80s), Project Director of Bristol Exploratory Hands-on-Science Centre (1980s), Exhibition Consultant to G4G1 Atlanta, Instigator & Designer of PuzzleQuest in Cardiff, and other related Hands-On Exhibitions. Curator of the Hordern-Dalgety Puzzle Museum. <http://puzzlemuseum.org>.

manor house, but also incorporated a maze in which one must find a path from the bunch of grapes to the bottle, along dark lines only.

Edward extended his many interests to include local politics. He was first elected as a Councillor to the Oxford County Council in 1985, and he was re-elected in 1989. His special brief was as spokesman for Museums, Libraries, and Recreation.

I first met Edward in 1973. He wrote to me, when I was co-founder and director of Pentangle, wanting to know the shortest solution to one of our sliding block puzzles. It transpired that his solution was already far shorter than we had thought possible. I phoned him up and asked him if he was a collector. He asked what I meant, so I asked him what he did with his solved puzzles. As he put his solved puzzles into a drawer instead of giving them away, I said he must be a collector. We soon visited each other and became great friends.

At this stage Edward's puzzling had mainly consisted of buying good wooden jigsaws of 1,000 to 2,000 pieces and an occasional cardboard jigsaw with up to 5,000 pieces. He had just discovered three-dimensional jigsaws and had commissioned a magnificent box of fifteen of Peter Stocken's beautiful puzzles. His mechanical puzzle collection, of around 200, fitted into a few drawers, and consisted primarily of Sliding Block puzzles, which he had found in books and made for himself out of Lego. As he got really enthusiastic about mechanical puzzles, the two-dimensional jigsaws were all put away in a cupboard. His house was a large one, and when I say "cupboard" I really mean a small attic room of several cubic meters. The two-dimensional jigsaws were still there filling the cupboard and gathering dust when the house was emptied in 2001. I am happy to say that all the fine wooden ones are now in The British Jigsaw Puzzle Library.

When Edward first visited my house, it was around the time that Jerry Slocum had told me that I had the world's third largest puzzle collection. Small by the standards of today's big collections, it nevertheless inspired Edward. He saw the huge variety that existed, and his enthusiasm knew no bounds. For the next 25 years he collected at an unsurpassed rate. He continued with all his extensive business activities and with his regular trips to Scotland, pheasant shooting. He seemed to effortlessly add puzzling full-time into his already full life. Instead of taking two holidays per year, one with his wife, and one with all the family, he added a third holiday for puzzling. He went to 19 annual "International Puzzle Parties" and, as they outgrew the small gatherings at Jerry Slocum's house, Edward joined Jerry and Nob Yoshigahara to form the supervising committee of the IPPs. He hosted the 10<sup>th</sup> and 19<sup>th</sup> IPPs in London. He only needed six hours sleep per night, and he is even reputed to have occasionally taken puzzles to bed.

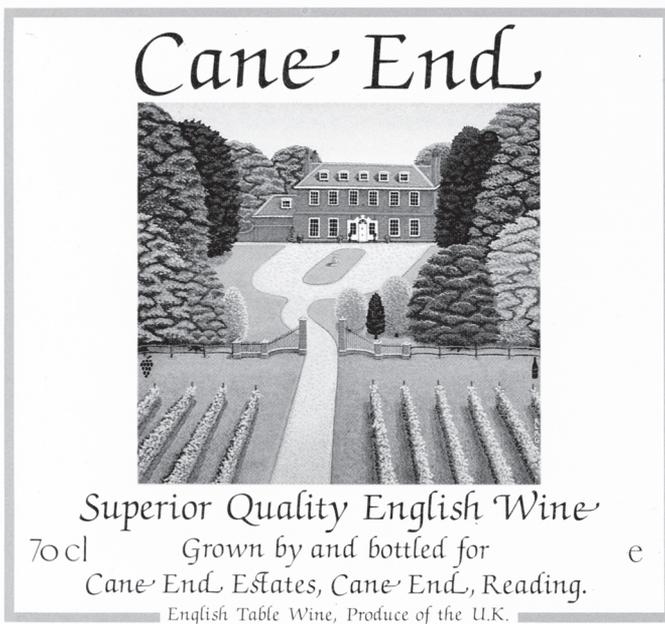


Edward Hordern in Tokyo in 1995.

His enthusiasm for sequential puzzles culminated with the publication of his book *Sliding Piece Puzzles* in 1986 by Oxford University Press. When one considers that this book was published before computers were in general use, it was an incredible achievement. Despite developments since, it remains the standard text on the subject, with many of his hand-done solutions remaining unbeaten.

In 1993 Edward privately published a wonderful Centenary edition of Professor Hoffman's *Puzzles Old & New*. It was fully corrected and with the addition of colour photographs of the original Victorian puzzles from his and other private collections. As "senior proof-reader" to the project, Laurie Brokenshire can attest to the very large numbers of errors, in both the original puzzles and their solutions, that Edward managed to spot.

Meanwhile he was filling his large house. Initially it was just his study, and then he started to encroach on the dining room. Fortunately, in the reign of Queen Anne, manor houses were built with serious attic rooms so, without upsetting his wife too much, he took over one of these. However, by 1999 he had puzzles in his study, in half the dining room, and in three attic rooms that were specially fitted with display furniture. He was also using a further attic room and most of the extensive loft space as a dumping and sorting ground for puzzles.



**Cane End Wine Label.** Follow the dark lines from the grape icon in the middle left, through the bushes, across the lower ledge of the upper roof, through the bushes again, to the bottle icon in the middle right. (See Color [Plate I.](#))

Edward collected all kinds of puzzles in an extraordinarily thorough way. Today it has become almost impossible to collect in the same manner. Few people have the space, and fewer are willing to learn about such obscure things as the care of 18<sup>th</sup> Century puzzle ephemera. Truly antique puzzles are becoming ever more difficult to find. The other big change in recent years has been the explosion of creativity in the puzzle world. This has generated such a profusion of new puzzles that it is difficult for anyone to collect all new puzzles as comprehensively as was possible in the past. This wonderful productivity is due to many factors, including Martin Gardner's writings and a few companies such as Pentangle in the UK, and Mag-Nif in the US, who, in the early 1970s, brought the puzzle market back from the oblivion it had suffered since the depression after the WW1. The International Puzzle Parties, the Gatherings for Gardner organised by Tom Rodgers, home computers, and above all the Internet have created a wonderful worldwide exchange of information. In the past, puzzlers were forever re-inventing the wheel, whereas now they progress from develop-

ments of others. Edward did not have much time for computers but he had a great influence on all the other areas of the puzzle world, and he is greatly missed by all who knew him.

Edward built up the finest puzzle collection in the world. To do this one needs to be a bit obsessive, but he never allowed his obsession to rule him. He remained a gentleman, interested and knowledgeable in a wide range of subjects quite unrelated to puzzles. He did not just collect puzzles. He solved his puzzles. He shared them with other people and always welcomed fellow puzzlers at his house. He was very generous in exchanging puzzles. It was wonderful that on his last antique puzzle hunt in London, only two weeks before his death, he found the last puzzle that he needed to complete his favourite group—his wooden Hoffmann puzzles.

Edward died of cancer on May 2, 2000 at the age of only 58. Throughout his painful illness he remained uncomplaining and continued collecting puzzles. His wife Wendy, two sons, and two daughters survived him. He knew that his first grandchild was expected soon, but very sadly did not live to meet his grandson Barnaby, who was born in June 2000.

I was overwhelmed when Edward's family gave me his collection. It was extremely generous of them. Even though I had packed the most delicate items myself, it took weeks of work on the part of a professional removal firm to move it. It was as if Edward had given me the ultimate sliding block puzzle. I have now had the collection for nearly two years and have amalgamated my own with it and separated out the duplicates. I still have not found time to finish counting it, let alone catalogue it all. I enjoy puzzling every day and the only thing that spoils it is that Edward is not around to enjoy it as well. I hope I can do justice to the collection and find a way to finance providing it with a permanent home within the UK before too many years pass. This would be a great memorial to a great collector.



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# Edward Hordern—Puzzle Solver Extraordinaire

Dick Hess

I first met Edward Hordern at the Second International Puzzle Party at Jerry Slocum's house in April 1979. I then visited him in England in July of that year at his house in Wyfold Grange. His impressive collection was taking good shape by then, but more impressive to me was his dedication as an enthusiastic puzzle solver. He had a rule: "A puzzle doesn't go on the shelf until I've solved it." Clearly he'd solved a lot of puzzles, because his shelves and drawers were packed with wonderful items. At that stage he was the world's expert at solving sliding block puzzles and had recently produced a 65-page book, *150 Sliding Block Puzzles with Solutions*. His solutions were all done by hand, taking hours of painstaking effort and resulting in careful notations of the solutions in his own hand. He was always eager to find improvements to what he had already developed. The effort was later expanded and published as his classic *Sliding Piece Puzzles* in 1986 with Oxford University Press.

An impressive display of puzzle rings, many made by José Grant, graced his wall. Amazingly, he had mastered the solutions to all of them. He explained to me that the rings with an odd number of bands (7, 9, 11, ...) proved the most challenging. His aptitude at solving these puzzles

---

**Dick Hess** is a long-time enthusiast of recreational mathematics and mechanical puzzles.

demonstrated his superior ability to think in three dimensions. He had also been a regular customer of Stewart Coffin for several years at that time. He told me that he asked Stewart to send him puzzles disassembled so that he could enjoy the challenge of solving them without the clue of seeing their final form. To my knowledge Edward always rose to this challenge and solved every one of Stewart Coffin's puzzles.

The Rubik's Cube craze was just hitting in 1979. Over the next few years Edward spent many happy hours solving Rubik's Cube and the avalanche of variants it inspired. He documented his efforts for each puzzle and in 1986 produced a booklet, *Solutions to Various Rotational Puzzles and Mechanical Sliding Piece Puzzles*, which gave his approach to solving no less than 21 puzzles. These included the Hungarian Rings, Engel's Enigma, Trillion, Ten Billion, Skewb, Dodecahedron and Rubik's Magic. As more such puzzles hit the market, Edward would solve each and carefully document his findings. Among these were Hungarian Stop Watch (1983), New Fifteen (1984), Rubik's Master-Magic (1987), Topspin (1989), and Roundy (1990).

Edward visited me in 1999 during one of his visits to Los Angeles for medical treatment. His enthusiasm for puzzles and puzzle solving was not reduced a bit by his medical condition, and as usual he asked if I had anything new in puzzling. I offered him two variants of the bent nails puzzle recently produced in Australia. He took them with him to bed and by morning had not only solved each but had joined one piece from each to create an entirely new and even better puzzle with two separate levels of difficulty. Edward was truly a puzzle solver extraordinaire. He is sorely missed by those who knew him.

# Nob Yoshigahara

Jerry Slocum

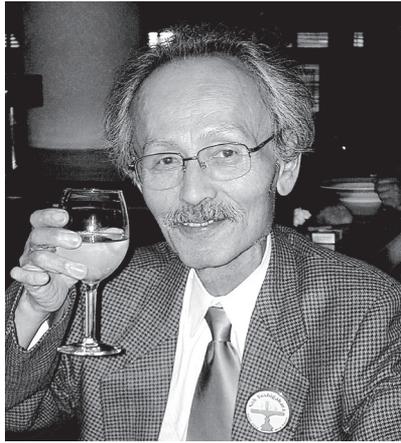


Figure 1. Nob at AGPC Convention, 2003.

Puzzlemaster, genius, International Ambassador of Puzzles, legend, and one of the best puzzle inventors that the world has ever known are some of the terms that have been used to describe Nob. His enormous accomplish-

---

**Jerry Slocum** is the author of nine books about mechanical puzzles and is also known for his research on the history of puzzles and his large collection of puzzles and puzzle books. He is the founder and organizer of the annual International Puzzle Parties, held in the United States, Europe and Asia.



Figure 2. Nob's AGCP double silhouette badge.

ments encompass inventing and designing about two hundred mechanical puzzles, which were produced commercially, with at least eight million sold in Japan and America. Rush Hour, made and sold by ThinkFun, is one of the most popular puzzles of all time. It has received fourteen awards from educational and popular publications. Nob also invented or helped to develop other ThinkFun puzzles: Hoppers, FlipIt, Shape by Shape, and Lunar Lockout.

At its annual convention in 2003, the Association of Game and Puzzle Collectors (AGPC) awarded their highest honor, the Sam Loyd Award, to Nob Yoshigahara (see [Figure 1](#)) for his “Lifetime achievements in the design of mechanical puzzles.” The convention badge (see [Figure 2](#)) shows a pair of left and right facing silhouettes of Nob forming the stand supporting several of his puzzles. His acceptance of the award is shown in [Figure 3](#).



Figure 3. Nob accepts the AGPC Sam Loyd award for his lifetime achievements in puzzle design.

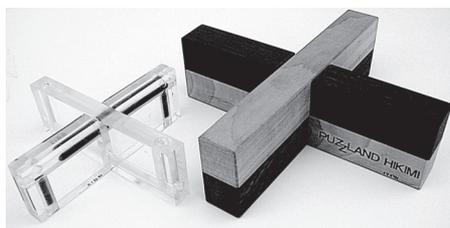


Figure 4. Nob's first mechanical puzzle, at age 19, the DuaLock.

## Mechanical Puzzles

Nob invented his first mechanical puzzle in 1955 at age nineteen. He named the puzzle DuaLock, which provided a clue to the solution. [Figure 4](#) shows a transparent version and the wooden production version made by Japanese puzzlemaker, Hikimi. To solve the puzzle, you must spin it to release one set of pins that lock it together. Then you must carefully turn it over, while preventing the first set of pins from re-locking the pieces, and spin it a second time to release the second set of pins.

During the last twenty-five years, Nob has been a driving force in developing, promoting, and popularizing puzzles in Japan. He designed or helped develop almost all of the forty-nine unusual and elegant pieces of the Glass Puzzle Collection from Toyo Glass Company. The Pack the Plums puzzle (see [Figure 5](#)) was their best seller. The plums represent extraordi-



Figure 5. Pack the Plums, in front, was the best selling of the Toyo Glass puzzles.

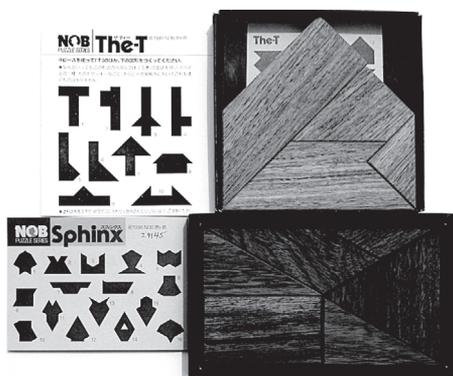


Figure 6. Two Hikimi wooden puzzles, with Nob's T puzzle on top.

narily sour Japanese pickled plums, and if you succeed in packing them in the glass—a very difficult task—you can turn the glass upside down, and the nine pieces will not fall out.

Nob was invited by the Mayor of Hikimi, a small Japanese town that was losing population, to supervise the establishment of a large puzzle exhibition and Puzzland Hikimi, a factory that made wooden puzzles using wood from their nearby forests. Nob also designed many of the fifty-seven wooden puzzles made by Hikimi. Figure 6 shows two of the Hikimi puzzles. Many of Nob's puzzles produced by Hikimi are shown in Nob's book, *Puzzle in Wood*, published in Japan in 1987 by Tokuda.

Hanayama's thirty-five-piece Cast Puzzle series was also developed by Nob. The series began using Nob's improved versions of antique cast iron puzzles from the USA and England. Then Nob developed numerous new cast puzzles. Some were based on ideas from expired patents but were considerably improved to provide excellent puzzles. He also worked with other puzzle designers from Japan, Europe, and America to develop many new cast puzzles. Figure 7 shows the improved, classic Star puzzle, Flag puzzle (based on an expired American patent), and Akio Yamamoto's new Amour puzzle. Nob's television appearances and continuous video sales pitch that played in 3,000 stores throughout Japan has increased the sales of Hanayama's cast puzzles ten-fold in the last several years.

Japanese customers have found that his silhouette on the boxes of this series of puzzles (see Figure 8) guarantees a very high quality puzzle that is fun to solve. And his puzzles have developed a large following. This is shown by the interesting fact that the most difficult cast puzzles are the best sellers.



Figure 7. Cast Puzzles by Hanayama: Flag, Star, and Amour.



Figure 8. Nob's silhouette on a puzzle indicated that it was of high quality and fun to solve.

Nob had an extraordinary talent for improving old puzzle designs as well as inventing entirely new puzzles. While he was translating Jerry Slocum's *New Book of Puzzles* (W H Freeman & Co., 1992) into Japanese, he realized that one of the solitaire puzzles, The Great 13 Puzzle, patented in 1899, had a lot more potential than was utilized in the original puzzle. He and his team of Japanese designers came up with 40 problems, in four levels of difficulty, using the same board. This puzzle was manufactured and sold by ThinkFun under the name Hoppers. When Hoppers came out, my grandchildren, Jack (age 7) and his sister, Sydney (age 11), were so taken by the puzzle that they sat down for several hours without getting out of their chairs and solved all 40 problems that came with the puzzle. (See [Figure 9](#).)

Another example of Nob's ability to redesign an old puzzle is the 100 year old classic "T" Puzzle. Nob modified the dimensions of the four pieces of the T Puzzle and provided twenty additional assembly problems to be solved with the new pieces. More than four million copies of Nob's puzzle The-T have been sold (see [Figure 6](#)).

Nob has helped and taught many puzzle designers in Japan, Europe, and America and has helped get puzzles of other designers produced. Nob's studio in Tokyo was a friendly gathering place for puzzlers from around the world, with thousands of puzzles with which to play. [Figure 10](#) shows Nob

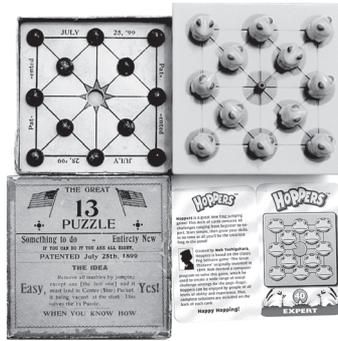


Figure 9. The original 13 Puzzle (left) and Nob's improved version, Hoppers, by ThinkFun (right).



Figure 10. Nob with puzzle designers Oskar van Deventer and Bill Cutler.



Figure 11. Puzzle designer and craftsman Akio Kamei and Master Craftsman Yoshiyuki Ninomiya with Nob.

with two other famous puzzle designers with whom he worked, Oskar van Deventer from the Netherlands and Bill Cutler from America. Figure 11 shows Nob with his friends, famous Japanese puzzle designer and craftsman Akio Kamei and Master Craftsman Yoshiyuki Ninomiya.



Figure 12. Puzzle collectors the late Edward Hordern, Nob, and Jerry Slocum.

Owning 14,000 puzzles, Nob had the largest collection of puzzles in Asia, as well as a huge library of puzzle books. [Figure 12](#) shows him with two puzzle collector friends, the late Edward Hordern and Jerry Slocum.

## Math Puzzles

Nob also created mathematical puzzles too numerous to count, wrote sixty puzzle books, produced as many as sixteen monthly columns, and translated English and German puzzle books into Japanese. Three longtime American friends who enjoyed challenging Nob, and vice-versa, on math puzzles are Don Knuth, Sol Golomb, and Dick Hess. The next article includes reminiscence from them.

## Puzzle Parties

One of Nob's favorite magic tricks was making a ball of crumpled paper disappear in front of some unsuspecting subject. [Figure 13](#) shows Nob just after he made the paper ball disappear for Ellen Ireland at IPP 7. Everyone in the room except Ellen saw Nob throw the paper ball (shown above her head) from his right hand an instant before the photo was taken. He also loved to entertain with his slight-of-hand skills using coins, by making them penetrate table tops and magically appear from the ears of amazed, and adoring, children.

In 1982 he brought his son, Takayuki, to his first International Puzzle Party (IPP 5), and Nob never missed one since. Larry Nichols, inventor of



Figure 13. Nob's magic made the paper ball disappear for Ellen Ireland.

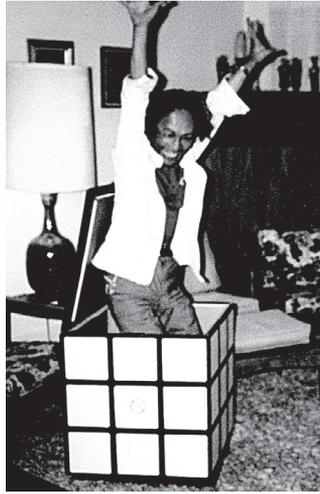


Figure 14. Nob-in-the-box makes a spectacular entrance at IPP 7.

a puzzle similar to the Rubik's Cube, attended IPP 7 in Beverly Hills in 1984. Nob burst into the Party from his hiding place, a cardboard Rubik's Cube box (see [Figure 14](#)).

Nob was the host of the first International Puzzle Party held outside America: IPP 9 in Tokyo in 1988. He also was the host of the next two IPPs held in Japan: IPP 12 (1992) and IPP 15 (1995). A special host gift, designed and made by Gary Foshee, was given to Nob at IPP 15 as a token of our thanks. [Figure 15](#) shows Nob's gift (his famous silhouette in Lucite and a six-piece Burr) being handed from Akio Kamei to Jerry



Figure 15. Nob is awarded a special trophy at IPP 15 for hosting three Japanese IPPs.



## Nob's Life

Nob did not have an easy life. At age seven, he left Tokyo because of the bombing danger during World War II and was living with his grandfather in Iwakuni, near Hiroshima. He found an English Solitaire board in the dusty attic of the house and solved the very difficult puzzle of reducing the pegs to one by jumping. When he showed his solution to the adults, who could not solve it, his maid considered him a child prodigy or Second Buddha. He wrote in 1990 that he still recalls the flash of light and sounds when the atomic bomb went off in Hiroshima. When he returned to Tokyo, he says, "I found it all burnt." Here is Nob's interpretation of these events: "Without this evacuation, exaggeratedly saying, without World War II, my puzzle life now won't exist. The war deliberately brought me a chance to go from puzzle, to puzzler to puzzlest." A chemical explosion burned him badly while he was in his late twenties, and during the last ten years of his life, he had serious problems eating, because his stomach had been removed due to cancer.

However, one little known fact about Nob's ancestry can help explain his drive for excellence, his persistence, and his philosophy of never giving up. He is descended from an Edo era Samurai who served the Mouri Family, a feudal lord of the Chugoku region of Japan. Nob, however, used his brain, rather than his sword, to solve Gordian Knot puzzles.

He is quite famous for his impossible puzzles, magic, jokes, wit, puns in English, and sense of humor. One of his mechanical puzzle jokes is what appears to be a six piece burr that Nob has carved out of a solid piece of wood. "Nob's Three-piece" burr—commonly made out of three notched sticks of wood which are orthogonally interlocked—he made out of two notched pieces of wood, as shown in [Figure 18](#).

On June 11, 2004, a week before he died in his studio in Tokyo, Nob visited our home in Beverly Hills. My son, Allan, and grandson, Jack,

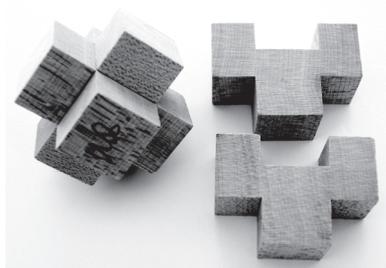


Figure 18. Nob's three-piece burr is assembled from 2 pieces.