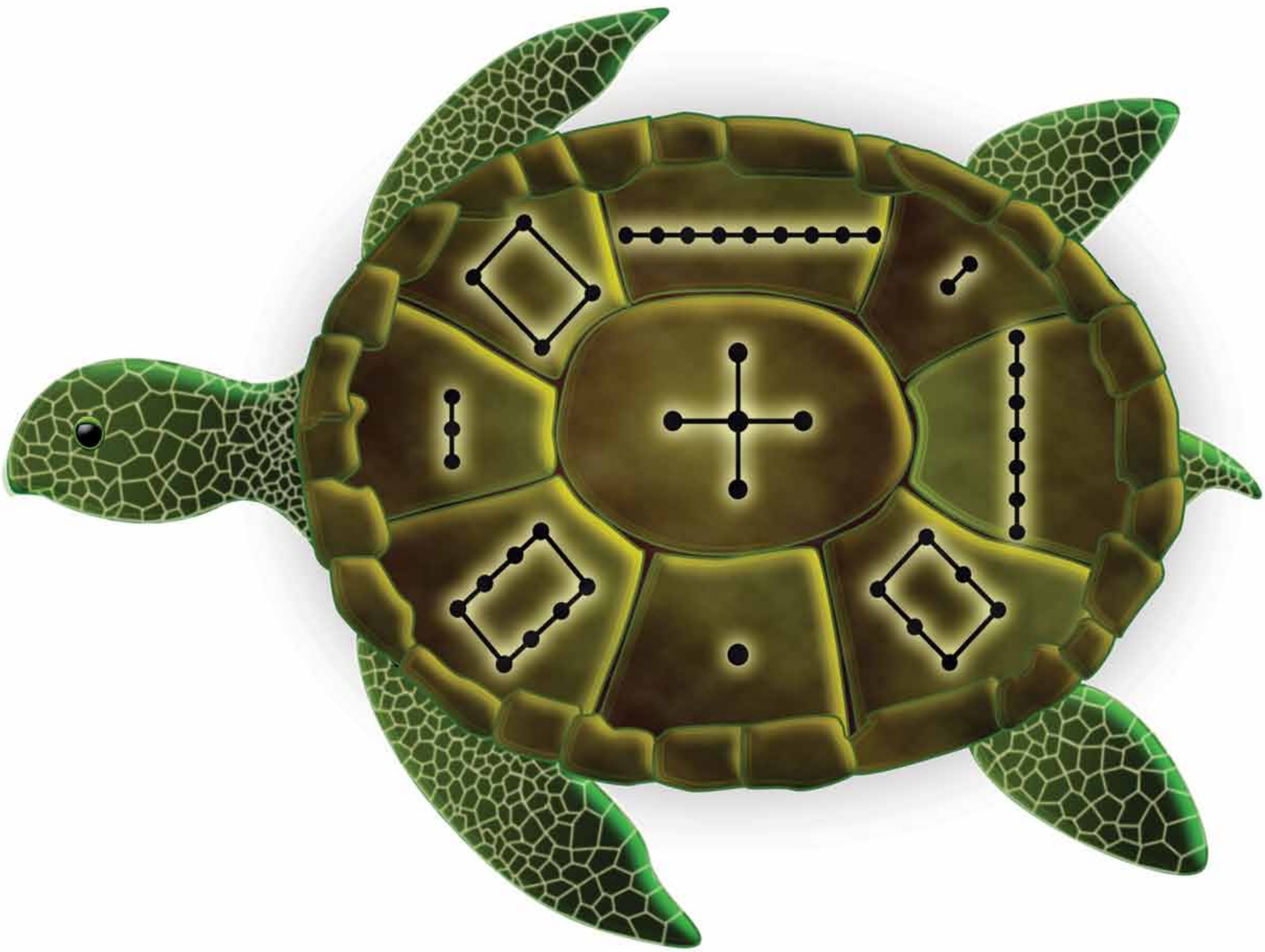
Ian McKinnon

Duplicate Bridge Schedules, History and Mathematics



AN HONORS eBOOK FROM MASTER POINT PRESS

By the same author

Bridge Directing Complete, 1979

Duplicate Bridge Schedules, History and Mathematics

by
Ian McKinnon

Edited by
Ron Klinger

Foreword by
Dr. Ross Moore

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This book is dedicated to my mother.
Born in 1917 and she still plays a great game of cards.

Graphic design work and the enhancements of the old photographs was done by Stuart Blythe.
The turtle on the front cover was designed and produced by Stuart Blythe (2012).

Summary contents

Full contents

Reproduced from the original picture by Maxfield Parrish,
The whist reference book, William Mill Butler 1898

'YE ROYALL RECEPCIOUN'

Ye King and Quene with plesaunce looke
Uppon ye grete Whiste Ref 'rence Booke.
"Now, wyffe," quoth he,"let all ye playeres
We meet in bataile say their prayeres!"
Whereat ye solemn Knaves bowe low;
And quoth ye Quene, "Aye, truly so!"

(Chaucer Redivivus.)

List of illustrations

Foreword

Ian McKinnon is well known on the Australian bridge scene, not only as a player, but also as the author of scoring software, which necessarily entails having a deep understanding of bridge movements. This book is his masterwork — the pièce de résistance, or Meisterwerk.

For tournament organizers and bridge directors, it serves as a compendium of all the 'best' movements to employ, for whatever number of entrants is desired in any particular kind of tournament. It also contains advice on how to modify movements into others, when something unforeseen occurs; e.g., a pair or team fails to arrive, or must drop out part-way through. Thus this book is very valuable as a director's guide to running bridge tournaments. However it is much more than this. The early chapters include some history and the personalities behind the development and use of different whist movements, explaining why some became popular while others fell out of favour. Many quotations and reproductions of old photographs allow the reader to appreciate the mind-set of people like Mitchell, Butler and Howell — names which are familiar, though the people themselves are not — and many others, now all but forgotten. Also there are reproductions of early marketing materials, including original card holders, board-sets, and movement instructions; the original attempts at these, from long before the mass-produced sets that are in use these days.

The third aspect of this book is the way in which the mathematics of bridge/whist movements and tournament schedules more generally, is presented. Starting from the recreational curiosity on magic squares, and leading into Latin squares and Graeco-Latin squares (which have considerable significance in Algebra and Combinatorics), the reader is introduced to the concept of Room square, which governs the structure of some Howell movements and which is named after the distinguished Australian mathematician Thomas Gerald Room. These are an example of the more general combinatorial structure known as an Incomplete Block Design, which has an important application in the design of experiments. In some fashion, every bridge tournament can be regarded as an experiment whose outcome is to determine the relative abilities of the pairs or teams taking part. So it is no surprise that such combinatorial structures should play a role and that there is much theoretical knowledge already available to be used when working out movements for bridge tournaments. Part of this knowledge is the concept of 'balance' for an Incomplete Block Design. In the context of a bridge tournament, using a Howell movement, say, this equates with a notion of the movement's 'fairness', having regard to how frequently two different pairs play as effective opponents or as effective team-mates. Measuring this appropriately for all couples of pairs, the fairest movements are those which minimize the discrepancy in these values, so that the presence of particularly good, or poor-performing, other players in the movement tends to have a roughly equal effect on all the participants. This aspect is discussed in some detail, and clearly applies to all kinds of movements, not just the Howell-based ones. Every movement presented in this book comes with a number called its 'Calibre', indicating how close it comes to the ideal 'best possible' of its type. Those with calibre of 100 (which means 100%) are ideal for that number of pairs or teams competing. However, in many cases the ideal is unachievable for practical reasons; nevertheless the movements in this book are of very high calibre indeed. Finding these was no easy feat, requiring much computing power to search among the myriad possibilities. This is work that has occupied Ian McKinnon over many years, with the results being recorded in his software, as well as in this book.

Extending the idea of Room square is the so-called House square. This is used primarily with teams' tournaments, having an odd-number of teams. In each round, three teams play a 'triangle' consisting of two half-matches against each opponent. These half-matches are completed in the next round, so that two full matches are completed over two rounds, and nobody needs not to play at all for any length of time. The House square was introduced by mathematicians D. R. Stinson and Walter Denis Wallis in 1984. Ian had faced Wal Wallis across the bridge table in Sydney in the early 1970s, and later came to learn about some of his work relating to bridge movements. More recently Ian established contact again, leading to Wal contributing much in the way of explanations and theory to the contents of this book. As recently as 2006, building on the work of Wallis, mathematicians Gennian Ge, Esther Lamken and Alan Ling described a new class of movements called ‘complete coupling round-robin schedules’ (CCRRS), where the acronym is pronounced as ‘scissors’ for convenience. Thus was born the ‘Scissor schedules’, which allow a teams’ tournament to be also scored as a pairs’ movement; thereby providing an interesting new kind of bridge event.

In the Appendices of this book, Ian pays tribute to the mathematicians whose work has provided many new schedules, not previously known, or who have supplied perspectives on the combinatorial structure of movements allowing new and better examples to be found. These include reprints of old papers — including one of my own, which was never published academically, though distributed in some bridge circles. Such a collection, and this book as a whole, should inspire further research. Who knows what new kinds of bridge movement may result? The book, while not likely to be read by every bridge player, certainly belongs on the shelves of every club and every Tournament Director, and those players (and maybe some non-players) also interested in the history and/or mathematics of tournament schedules, particularly of bridge movements.

Ross Moore
February 2012

Preface

Behold the turtle. He makes progress only when he sticks his neck out.
James Bryant Conant

Since my first book 'Bridge Directing Complete' (BDC) things have changed extensively in the world of electronics, publishing and particularly computers and their use in bridge. BDC was designed to be used by tournament directors so they might conduct their events well. Before and since that time (1979) there have been several books published for the tournament directors to assist them in doing their job well whether they are at a local club or running a national event. This book, as the title implies, is not an attempt to replace any of these books. I hope the title 'Duplicate bridge schedules, history and mathematics' describes the nature of the contents. I also hope it can be used by bridge tournament directors to complement the director's book they use regularly.

You will find many historical details throughout the text including details on many of the people involved. Therefore I think it only appropriate that I expose my background and credentials, for the want of a better description. I was born on a Thursday in February 1945 at a hospital in Parramatta at the edge of the western suburbs of Sydney. The location is now the centre of the greater city of Sydney, Australia. My early education at the Wentworthville infants and primary school was far from ideal and can only be described as a blackboard jungle. I did manage to dodge the flying blackboard dusters, though many of my fellow students in the class of 40 were not so fortunate, ending up with split foreheads.

At the age of 11 the family moved to Tamworth in northern New South Wales where things took a turn for the better. Once I had finished my high school education at Tamworth, where I had passed mathematics with honours, I went to the University of New England at Armidale, an hour's drive, north of Tamworth. There were a number of significant events that occurred while there, setting the course of my life and career. Two of these things happened in 1964. The first was the mathematics faculty took delivery of their first computer which I learnt to program. The second was I moved to the Lawson house of the Sir Earle Page College where the resident tutor needed a second, third and fourth for bridge. Alan Walsh and I were two of the starters and we commenced our pursuit of the game with vigour.

Over the next two years my academic efforts were quite poor and my interests in bridge affected this significantly. Alan who clearly knew what was important in life better than I did, gave up University at the end of 1965 and so did I at the end of 1966. Ironically, if I had completed my degree in mathematics I would have automatically entered the NSW Education Department teaching mathematics because they were paying my university fees. Instead I moved to Sydney where I immediately got a job and career in computers – "you know what a computer is?" was the only qualification I needed.

Alan and I now worked together, played bridge together and by 1968 were representing NSW at the national championships with the greatest of team mates, Denis Howard and Tim Seres. In doing this we were playing regularly at the NSW Bridge Association where the tournament director was Bill Schaufelberger (1902 – 1972). In the last years of Bill's life he and I became very good friends. He wanted to give up the tournament directing and encouraged me to take over the reins at the club. He was a wonderful mentor and taught me many things about directing. I became very interested in movements, their structure and mathematics. From this time on I became less interested in playing bridge and more involved in directing.

Bill and I used to talk about lots of things while we were waiting for the players to finish a round or session and he told me many stories. One that sticks in my mind was about Tim Seres (1925 – 2007), who is considered the greatest bridge player ever to have played for Australia. Tim arrived in Australia in 1947 from Hungary though he was born in Austria. Tim could not speak English, but when he walked into the club run by Bill and he started playing, it was obvious to Bill how good Tim was. As Bill said "Tim could not bid to save his life but he could really play the cards". Bill was Hungarian, arriving in Australia in the 1930s, so communication between the two was easy and Bill took Tim under his wing. Tim said later "my first taste of serious bridge was with the N.S.W. team of 1948, captained by Bill. I owe a great deal to the lessons of those early days." I can also say that I owe a lot to Bill for getting me interested in directing and those lessons of the early days.

All through the 1970s I was working as a computer specialist and directing tournaments at the state and national level. In 1972 we had the first Australia-wide pairs with almost 1,300 entries which I match-pointed using the results of the winning pairs at each of the clubs. In 1973 this event was scored by me over the entire field of 416 tables using a Honeywell computer. This annual event continued for many years averaging around 1000 pairs. These were reported each year in the 'Australian Bridge' magazine, edited by my friend, Ron Klinger, whom I had met in the late 1960s and played bridge with on occasions.
During the mid-1970s I did all my early research on movements using a Honeywell computer, owned by my most generous employer. The computer I used was a powerful mainframe (for the time) worth millions of dollars, but even so the power was nowhere near that available to me in recent years using an off-the-shelf PC, costing a couple of thousand dollars. These Howell movements were first reported in BDC in 1979. In 1976 I traveled to Europe for the World Bridge Olympiad and caught up with Frank Farrington, who was in the process of putting together his final edition of 'Duplicate Bridge Movements', also published in 1979.

The one thing that Frank and I did not understand well at that time was the balance of movements. John Manning of the U.K. published his paper 'Mathematics of duplicate bridge tournaments' in September, 1979, just missing BDC and Farrington by a few months. I received a copy of that paper from John, but the horse had bolted. In the 1980s I was too busy making money and raising a family to consider bridge movements, but did correspond frequently with Olof Hanner, who was continuing research into many different types of movements and their balance.

John Rowland Manning was born in Surry in 1925. He obtained his MA degree in mathematics from Cambridge University. By 1963 he was the head statistician at the British Boot, Shoe and Allied Trades Research Association, Kettering, Northhamptonshire, the town where he lived. One of his papers of that time was 'the changing shape of high-heeled shoes' where John made the point that the optimum heel height for a size 5 shoe is 2.5 inches. This has particular meaning to me as my father (died 1976 aged 61) was a cobbler and I do remember him having problems dealing with the much higher and fashionable 'stiletto' heels being produced for women's shoes at that time.

I believe the subject of balance is tackled thoroughly and correctly in this book. The meaning of 'balanced' has changed significantly since 1979, with the pure mathematics underlying this issue being fully defined by Mr. John R. Manning. More recently a measure of imbalance has been defined precisely by Dr. Ross Moore of Macquarie University, Sydney, in 1992 when he published 'Too many switches spoil the balance'. It was this paper that brought my attention to the inadequacies of many movements in my first book. These finding are included in this edition, as well as adding some more ideas. In recent years the contributions on balance by Peter Smulders of Holland are of particular significance.

The advances in pure mathematics are also most significant. In particular the advances made in the branch of mathematics known as combinatorics are of particular importance to the production of bridge schedules. Combinatorics concerns the study of finite or countable discrete structures and covers many areas such as graph theory, algebra, probability, topology and geometry and is used in many fields of application such as optimization, computer science and statistical physics. These many applications have meant there has been significant funding available to the pure mathematicians working in this area.
The bridge community has also been lucky that one of the leading mathematicians in combinatorics was keen to advance those areas that apply to bridge schedules. His name is Professor Emeritus Walter Wallis and a fellow Australian who attended University of Sydney at the same time as Ron Klinger. I also met Wal in the early 1970s, but only across the bridge table. Walter Denis Wallis was born on 26 June 1941 and currently is Professor Emeritus, Department of Mathematics, Southern Illinois University. He obtained his PhD at the University of Sydney in 1968.

During the 1970s and 1980s I met Ross Moore a number of times, particularly across the bridge table as a fierce opponent, but our mutual interest in mathematics and bridge movements made the relationship a bit special. Ross was born on 21 May 1955 and completed his BSc(Hons) at the University of Melbourne in 1977. He then went on the complete his DPhil at Oxford University in 1981, returning to Australia and working at Australian National University until 1986 and then to the Macquarie University where he is today. Up until October 2009 Ross Moore was gladly answering my questions and guiding my research in the right directions. I found the Internet a great source of papers, particularly those published by Wal Wallis. It was when I was struggling with the mathematics published by Wal and his colleagues that I established contact with Wal Wallis again, and from that time on he became a major contributor to the content of this book.

In this book I hope to expose the link between mathematics and bridge schedules in a way that is understandable to most people. I hope this book also supplies the groundwork for any future research into bridge schedules.

The use of computers has allowed me to dispense with the appendices found in the first book. Percentage tables are no longer needed, as computers do all the scoring of bridge events today. The expansion of bridge movement details are no longer needed because this edition should be used in conjunction with a computer software program that I have developed that allows you to view or print out those details at a click of a button. With this you can produce table guide-cards, player guide-cards and director's instructions for any movement. It also means that any pairs' movement can be balanced.

This computer program, called 'Jeanie', is clearly a play on words for Genie, the wizard that will supply your needs as you wish. It also recognizes my mother, Jean McKinnon, as a major contributor to the first book when she sat for many months typing in the text for the photocomposition program that I was responsible for at Honeywell and used for that publication. She used a telephone line and modem many years before the Internet was a public facility.

Let me make one thing very clear about copyright. Bridge movements are used for the pleasure of bridge players throughout the world, making their games as comfortable and fair as possible. Many movements in this book have been published before and the original source of some of them is likely to be open to debate. In fact one of the objectives of this book is to resolve most of the debate. Where I am certain of the origin I will make that very clear but for some it is not clear. Therefore while the book has a copyright held by me, and reproduction is forbidden without my permission, the movements can be used by any organizers to conduct their bridge tournaments.

There are many new movements included, too. Some are the result of my own research and development and some are from research carried out by other mathematicians. Some are the result of manipulation of existing movements from various sources, including my first book. It is possible to take just about any movement and change it to appear almost nothing like the original. This is one of the things illustrated very clearly in this book. Some of the movements come from mathematical papers that are completely unusable by bridge organizers until they are manipulated and presented in an understandable form. Some are a result of manipulation of an existing movement so that the movement is easier to use. This could be considered plagiarism in some cases, but there is definitely no intention on my part to do that. Any changes are for presentation, simplicity or consistency or all three.

Because the number of movements included in this book is extremely high it is not possible to show all in an expanded form. Therefore it is important for the reader to become familiar with the shorthand methods of representation, so that they can use any movement. In addition many are difficult to edit and proofread and would be prone to error, except that all movements are computer tested and generated. Any manual data entry is done with the aid of computer software and fully checked and validated by the computer before being exported to the textual form shown in this book. For this reason the reader can be very confident in the integrity of the content.

Duplicate bridge schedules for tournament directors and organizers are the objectives of the book but there is an attempt to make the text entertaining for other readers, particularly those who solve Sudoku puzzles.

There are three subjects: schedules, their history and their mathematical origins. I do realize that many readers will not be able to understand some of the mathematics or may not be interested in the mathematics, in which case simply skip over those chapters.

This book is the result of many years of computer software development, research and writing. The first draft was produced early in 2003 and the first version of Jeanie appeared on the Internet in October 2008. During the compilation of the information held in this book many sources and persons were used and consulted. The Internet has a lot of details about many aspects discussed in this book. Many ideas and concepts have been developed over time by discussions between bridge organizers and where possible, I have tried to summarize those ideas into a reasonably concise document. Where there is debate I have tried to present both sides and leave it up to you, the reader, to make your own decisions.

Special thank you

I am only wise insofar as what I do not know, I do not think I know
Socrates

Without the help of two special people this book would not have been produced. They both gave their time and extensive knowledge on their respective subjects without consideration of any monetary rewards or acknowledgment in authorship. Even so without their contributions this book would not have appeared. They are Wal Wallis and Ron Klinger.

Wal Wallis. My first email to Wal on this matter was sent during October 2009. Since then he has worked tirelessly, answering all my questions and supplying me with any mathematics missing from my repertoire. Many of his papers are available on the Internet, but knowing how to interpret much of the material was another matter.

When I would ask a question he often answered with the complete notes, supplying me with lecture notes given to his University students. In addition Wal was able to come up with many papers that I had never seen or have been unable to locate. Sometimes he would send a paper "have you seen this one?" Of course I had not and it would open up a whole new path of research.

Ultimately when I hit a brick wall on a particular movement I would ask "can you find this for me?" and he would spend many hours chasing it down without expecting any rewards apart from the joy of solving the mathematical puzzle.

All of this comes from a man who is the leading mathematician in the field of combinatorics and so has many demands on his time from commerce and research all around the world.

Bridge organizers, tournament directors and bridge players of the world will always be in debt to Wal.

Ron Klinger. Ron is a well known author of bridge books, videos and magazine articles as well as being an excellent bridge teacher and an expert player with countless successes in all sorts of events around the world.

Clearly Ron is a very busy man. Even so when I asked him to sort out all my scruffy writing in this book he did not hesitate to offer full assistance. With my mathematical background, my grasp of written English leaves a lot to be desired. Ron on the other hand has a background in Law and is a very experienced writer and able to identify faulty sentence structures in a blink of an eye.

He spent many hours reading through my efforts correcting grammar, punctuation and structure. Without his editorial contributions the book would not be anywhere near as tidy as it is.

As a long time friend and mentor I must thank Ron for his encouragement and support, without which this book would not have become reality.

Introduction

A question that sometimes drives me hazy: am I or are the others crazy?
Albert Einstein

This book is primarily aimed at bridge tournament directors. Even so I am hoping there is enough to amuse and entertain those who play duplicate bridge or those interested in mathematical squares or those interested in the history of duplicate bridge. It also applies to those wanting to know more about sporting tournament organization schedules particularly where it applies to duplicate bridge.

Techniques used in organizing tournaments change over time as well as differing in most countries so there is no intention to address these issues. Also computers are used today for scoring bridge events and so no attempt is made to cover scoring apart from its relationship to choosing movements. Most tournament directors when running club events want to supply the best movement to their players and handle any difficulties quickly and efficiently. When conducting larger events the issues of organization become more demanding and the planning is the prime concern. This is where the director will find this book invaluable in the provision of the best movements for all situations.

The approach taken is to supply all the available movements for teams, pairs, teams of pairs and individuals together with all modifications of these that can prove useful. As comprehensiveness is one of the aims, movements are included which are useful only in very rare cases.

All tournament directors should be encouraged to understand the principles and mathematics behind movements, so that a movement can be changed at the last minute with the minimum of trouble. Equally important is the confidence instilled in the players through their awareness of the director's ability to organise their events smoothly and quickly.

The director's primary considerations at all times should be player comfort and accuracy of scores. The major factors in achieving these are simplicity of movements (within the bounds of the tournament), playing of all boards by all contestants in the event and adequate player comparison on all boards.

Wherever possible, simple movements should be a sine qua non for the director, as the players are there to play bridge, not to solve bridge movement problems. In other words the director should choose the movement that gives the desired results (one winner or two, etc.) with minimum fuss and maximum accuracy.

Player comparison is an issue that has received much debate over recent years and that is dealt with thoroughly. The use of balanced or fair movements should be selected over ones that are unfairly imbalanced. All players want to feel that their efforts at the table are not unfairly influenced by imbalanced movements that favor other players. With the aid of this book the director can now choose to use a balanced movement in preference to others.

This book is about duplicate bridge schedules, their history and the mathematics behind them. Before we get into bridge schedules though we must digress somewhat so that we can get a real feel and understanding of its origins. We start with the history of the mathematics, then the history of duplicate bridge and the recognition of the need for player schedules.

Let me make one thing clear: each chapter can be read without reference to the previous ones. If you find the subject of any chapter, particularly the mathematics, is beyond your comprehension, simply skip forward to the next chapter.

For the tournament director you will find there are many new movements. Most of these are not needed very often. They are as a result of the research of the mathematicians over the past 30 to 40 years and in particular the findings of Professor Emeritus Walter Wallis. The most recent research has delivered a completely new event type and its new schedules and movements.

By way of introduction we should consider the differences in the branches of mathematics. The modern school of pure mathematics was established by the famous English Mathematician Arthur Cayley in the mid 1800s. Pure mathematics is motivated by pursuit of reasoning and logic without any interest in the application. All the mathematicians we refer to in this book are from the school of pure mathematics. They are pursuing their subject with ever-increasing detail building upon previous theorems and structures such that there is never duplication of effort. One of the consequences of this inherent approach is the need to scan an apparent never-ending pyramid of papers that reference previous papers.

Applied mathematics is a branch of mathematics that concerns itself with the mathematical techniques used in the application of mathematical knowledge to other domains, in our case, bridge schedules. Having done the research my job with this book is to present the structure of the mathematics as applied to duplicate bridge. In doing so I am hoping to give the reader some understanding of the history of bridge schedules both mathematically and as required by the organizers over the last 120 years.

The modern computer is an excellent tool for supplying us with new variations on the themes we already know as well as finding better and new movement schedules for tournament directors around the world to conduct their events with precision and perfection.

ADVANCED

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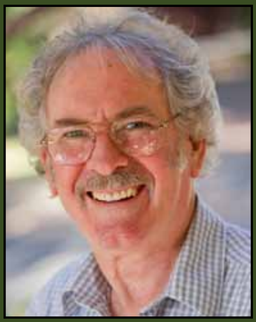
THE BRIDGE MOVEMENTS ENCYCLOPEDIA

Duplicate Bridge Schedules, History and Mathematics is an essential book for tournament directors as well as bridge players curious about the history of the game of duplicate bridge. This comprehensive volume supplies you with all the movements ever thought of and many hundreds of new ones. Included for each movement are the variations, modifications, origins, authors and history of its development. Each movement is then assessed for its measure of quality, called calibre.

The author presents a brand new event type, the Scissor movement — run like any Howell movement. In this type of event the players play as pairs as usual, but also have their teammates as another pair, never meeting each other. This allows the event to be scored both as teams and pairs, producing a winning team and a winning pair.

Duplicate bridge players will find the history of their favorite game most intriguing. The book delves into the lives of well-known figures such as John T. Mitchell and Edwin C. Howell. When did they live, what did they contribute to bridge, and what were the politics of their time? In addition, many lesser-known historical figures are examined for their contributions to the development of duplicate movements.

For the mathematically inclined there are plenty of interesting oddities. The mathematics of balance of movements, giving the measure of quality, is thoroughly discussed. The controversial debate over movement quality, along with its history, is presented through the ideas and opinions of players and mathematicians.



IAN McKINNON is a mathematician, expert bridge player, tournament director, author and computer professional. Through circumstance, around 1970, he started tournament directing at a major bridge club in Sydney which eventually led to him being the senior Tournament Director within the Australian Bridge Federation during the 1970s. He produced his first book, *Bridge Directing Complete*, in 1979. All those years of experience, and the last ten years of intense research and computer programming, have resulted in this book.

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