Issue 2 Summer 2000
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Abstract Games

... for the competitive thinker

- Game and book reviews
- Connection games: Twixt and Hex
- Strategic analysis: LOA, Kyoto Shogi
- Mem: a game that deserves a revival

Front Cover

The game board featured on the front cover is for playing an Indonesian variety of Mancala called Congklak. This 2x5 version of the game is played in the dry, mountainous area of Gunung Kidul, near the city of Yogyakarta.

Congklak is a game for two players, who take turns to move. To start the game, the players place the board between them with five pieces (in this case cowrie shells) in each of the ten smaller holes. Each player owns the row of five holes nearest himself together with the larger storage hole to his left.

On a turn, a player selects one of the five holes on his side of the board that is not empty and lifts all the pieces out of it. He distributes them around the board, one at a time, in each of the holes, moving in a *clockwise* direction, starting from the hole immediately to the left of the hole the pieces came from. He includes his own storage hole in this distribution, but not his opponent's. This is the first "lap."

If the last piece falls into an empty hole or into his storage hole, his turn finishes. If the last piece falls into a hole containing one or more pieces then these pieces are all lifted and the turn continues by distributing these as before. A turn may consist of many laps.

If a turn finishes by the last piece of a lap landing in an empty hole on the player's own side of the board, then any pieces in the hole opposite, on the opponent's side of the board, are captured and added to his storage hole.

If a lap consists of eleven or more pieces then the hole that these pieces came from is included in the distribution. If a player is unable to move because there are no pieces left on his side of the board, his opponent captures the remainder and the game finishes. The player with most pieces in his storage hole at the end of the game wins.

See page 21.

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A Note on Gender
Pronouns "he," "him," etc. have been used in non-gender-specific situations. We realise that women play games, too, and this is merely to avoid awkward constructions such as "he/she."

Editorial

The first issue of *Abstract Games* was launched with trepidation, but we hoped the readers would understand our motivation and appreciate the magazine's potential. Many did, and we received a great deal of heartwarming, enthusiastic feedback. We would like to extend our sincere thanks to everyone for their kind comments, suggestions, and, yes, subscriptions.

You may notice that Issue 2 is a little bigger than Issue 1; Issue 3 will be larger still. We hope to hit our stride by the end of the first year.

We have done some work on the website, which can be found at http://www.abstractgamesmagazine.com. Like other aspects of this venture, it is an evolving project. We are thinking of having a page on which readers can post information and photographs about their favorite games. Comments and suggestions are welcome.

We return in this issue to two of the games covered in Issue 1, Lines of Action and Kyoto Shogi. We had wanted to publish a second article on Bashne, another game from Issue 1, but there was simply not enough space this time. Likewise, we have some excellent material on Philosopher's Football and Epaminondas which will have to wait until the next issue.

We are still working on obtaining some material about Bao, the "King of Mancalas." The greatest two-rank Mancala is Wari, and by analogy I like to think of Wari as the "Queen of Mancalas." The group from the University of Alberta who developed the invincible Chinook checker-playing program is apparently close to solving Wari. We will be looking into this in a future issue.

This may almost be regarded as a special issue on connection games, as we have debut articles on Twixt and Hex; Lines of Action may also be classified as a connection game, albeit non-typical.

It seems incredible from our perspective that the first true connection games were invented only as recently as 60 years ago. Connection subsequently became one of the great themes of twentieth-century abstract gaming, and many prominent game inventors have contributed their own interpretation of this theme.

Older abstract game themes had dealt primarily with warlike or territorial objectives. It seems particularly appropriate that connection games should have arisen during a period when technological advances were leading to an exponential growth in communication. I wonder if there is still the potential for another radically new abstract game concept.

We promised to respond to reader feedback, and there appears to be a demand for material on Chu Shogi. The only reason for hesitation is that we had assumed the readers of this magazine would know Chess but not necessarily Shogi: learning Chu Shogi would perhaps be quite a challenge for someone who does not know Shogi. From what I know about the people who have so far subscribed, I may well have underestimated the game sophistication of the average reader. What do you think? Should we carry a regular column on Chu Shogi, or should we investigate Wa Shogi or Grand Chess, or some other Chess variant altogether?

The Mind Sports Olympics is the premier venue for over-the-board abstract game tournaments. It is held every year in August in London, and this year will be the fourth MSO. The location is good for people living in Europe, but a little inconvenient for North Americans and Antipodeans. On the other hand, the regular Olympics was held in the ancient Greek city of Olympia for the first *thousand* years of its history, so there is a precedent for keeping it in London for the time being at least. .

MSO is very prominent online, with a massive website. I should mention that I will be appearing on a Mind Sports guest online chat session on May 21 at http://www.msoworld.com/chat.html between 9pm and 11pm GMT.

MSO was unable to give us a press release about their fourth Olympics, this August, at the time of writing. We will be taking a closer look at the MSO phenomenon in a future issue.

Speaking of press releases, we are happy to print information from game publishers about new releases, proprietary game tournaments and so on. I encourage communications officers to put us on their lists.

Kerry Handscomb

Letters

Today I have received the copy of your magazine. Only one word: wonderful! I am a fan of abstract games and to read a magazine dedicated to them fills my heart with joy. Great work and "Lunga vita ai Giochi Astratti!"

Giusepe Baggio, Italy

I must say the appearance and content are first rate. The only thing that puzzles me is why you would embark on such a venture at all--rather than the obvious alternative of a web-only publication. Surely the economics and logistics of producing paper must be daunting?

Dave Dyer, USA

The best answer I can give is the aesthetic pleasure to be derived from a print publication. -- Ed.

I liked all the articles, the one on LOA best; Kyoto Shogi's the only one that didn't much grab me because I've never been much of a fan of the Shogi family. A very attractive package and I wish you immense success. My only negative impression is the size--I was glad to see in your letter that the next issue will be a little bigger.

Philip Cohen, USA

Notation

A standardized notation is used for all games when possible. In diagrams, squares are named using an algebraic system. Starting from the bottom left of the diagram, columns are identified by the letters a, b, c ... and rows by the numbers 1, 2, 3 .... A colon ":" is used to indicate captures. A threat to win, or check, is indicated by a "+" sign after the move.

Moves in Chess variants are indicated by the initial letters of the name of the piece moving together with the destination square. ("N" is used for knights.) Sometimes the start square is also indicated to avoid ambiguity. Captures are noted with "x," and "+" is reserved for promotion. Promotion in the Checkers variants is also indicated with "+."

With Shogi variants, we will follow the traditional Japanese way of identifying squares. From the top right, *rows* are a, b, c ... , *columns* are 1, 2, 3 .... If the value of a piece changes at the end of a move, we will use "=" and the new value.

Lines of Action

You said that Parlett made an error in his LOA rules concerning simultaneous clumping being a draw. That was the rule in Sackson's original *Gamut of Games*. I do not know when or at whose instigation the rule was changed to what you call "the usual rule," but it was quite recently that I lost a game because I was unaware of the switch, having only the 1st. Edition.

Paul Yearout, USA

Lines of Action is a splendid game. You possibly know that I launched the World Over-the-Board Championship at the Mind Sports Olympiad in London in 1997 with 500 pounds prize money and that the tournament has been held annually ever since. I mention this because I reinstated Soucie's original rule that a play that united both sides was a draw. I felt that the NOST rule that this is a win for the player making the final move was both arbitrary and illogical although I know that it is widely accepted.

David Pritchard, England

I was not aware of the of the MSO rule for simultaneous connection, although I did know that it was Soucie's original rule. Awarding the win to the moving player is presumably through a desire to minimize the percentage of drawn games.

Upon reflection, I agree that it is more logical to rule simultaneous connection a draw. This is quite a rare situation in LOA in any case and would not therefore greatly increase the proportion of drawn games.

To my mind, there is nothing necessarily dreadful about a drawn game anyway. Perhaps the desire to minimize the number of draws at all costs is a result of negative experiences with inherently drawish games like Chess and Checkers. -- Ed.

Issue 1 of *Abstract Games* looks excellent: very high quality. I intend to examine each article in great detail, and you can expect plenty of feedback from this reader. My personal preference at the moment is for Chess Variants and I would like to see more attention given to the large variants particularly. Another idea you might consider is to add an interactive element to the magazine, such as a problem ladder. You could use either unorthodox Chess pieces and rules or non-Chess games.

Graham Allan, USA

Any support for a problem ladder? -- Ed.

Corrections from *AG1*

In the Bashne article on p.8, the correct address for Sergey Ivanov's program is http://www.PhysTechSoft.com/en/download.html. Also Victor Pakhomov is apparently not manufacturing Bashne sets. On pp.6,8 incorrect transliterations from the cyrillic were given: V. Viskovitsov should be V. Viskovatov, and Anatoly Zbarg should be Anatholy Zbarj.

In the Lines of Action article, p. 9, 2nd col., 3rd para., 1st l., c1:e3 should be c1:a3; p. 10, 2nd col., after 7....h5d5, d5:c3 should be d5:b3.

In the Trax review on p.4 the correct definition of a winning line is a "line connecting opposite and outermost edges of the layout (tiles in play) over at least eight rows of tiles, across or down."

Thanks for the inaugural issue of *Abstract Games*. A great initiative. In fact the best I've seen because no-one before narrowed it down to this fascinating field

Christian Freeling, Netherlands

The copy of Issue 1 of *Abstract Games* arrived today. The magazine looks wonderful!! I particularly like Connie's cover photo of the Camelot set.

Steve Evans, Australia

Splendid magazine! I was intrigued by your remark that opportunities for creativity are limited in established games. If 'creativity' is thought to mean 'treading uncharted territory' you are absolutely right, but then the only 'kick' you get out of it is the encounter with the 'unknown.' Games as competitive systems are devised so that they provide 'encounters with an opponent,' not so much encounters with new situations. Good games resist boredom.

Peter Blommers, Netherlands

Congratulations on *Abstract Games*! It is the kind of magazine I was always looking for. You have the board notation for Kyoto Shogi because it is different from Chess. As I am (and surely others as well) not familiar with the Chess notation it would be very helpful if you put the notation beside the board for all games

Jochen Drechsler, Germany

What do the readers think? -- Ed.

Abstract Games welcomes your views. We wish to accurately reflect the concerns and interests of the readership. Letters may be subject to editing for clarity and brevity.

Game Reviews

OCTI

Invented by Don Green

Octi is played on a 9x9 board with flat octagonal pieces called pods and short sticks called prongs. Each of the eight sides of a pod has a hole into which a prong may be inserted. The players start the game with a reserve of seven pods and 25 prongs each. The pods of the two players are distinguished by color, but the prongs are homogeneous. Each player has three home-base squares. The objective of the game is to occupy your opponent's three home bases with your own pods.

Pods can move one square or jump over other pods, friendly or enemy, as in checkers. Pods can only move or jump in the directions their prongs point. Enemy pods which are jumped may be captured, their prongs being added to the capturer's store. Friendly pods may be stacked up on one square and may be moved and jumped as a single unit—they can also be captured as a single unit if jumped by an enemy pod.

At the start of the game each player puts a prongless pod on each of his three home bases. Thereafter, on each move a player has a number of choices: he can add a prong to a pod, move a prong to a different location in a pod, move or jump a pod (or stack of pods), or enter a reserve pod. Captured pods may also be liberated under certain conditions.

This is not a game that gives the impression of having sprung fully formed from the inventor's brain. I suspect that Don Green tinkered with it for years before getting it right. He has done a good job: the game appears to be remarkably well balanced.

There is a peculiar satisfaction in constructing one's small army of pods bristling with prongs. This pleasure is enhanced by the fact that the wooden pieces are so nice to handle. The board is vinyl, but at least it enables the game to be packed away into a compact box. Careful consideration has obviously been given to the presentation of this game.

I have the feeling that there is a very broad range of strategies available, allowing the players considerable scope for creativity. At first the pods reminded me of customizable Shogi generals as their scope of movement when not jumping is only one square. It also occurred to me that the Chu Shogi strategy of a long, slow build up may be advisable because a premature attack may be repulsed by an opponent who has built a stronger force in the meantime. Our games did tend to start off slowly by inserting prongs and bringing on reserve pods before making a move for the enemy camp. Once the pods get moving, however, the action can be surprisingly fast and decisive. According to Don Green, time is the most precious resource, which also reminds me of Shogi.

The game can be extended by allowing each player a "superprong," which gives a limited choice of second move each turn, and by playing on an edgeless, or toroidal, board. Although we did not have time to test these variations, I suspect they are the options of choice for experienced players.

OCTI was chosen as Best New Abstract Strategy Game 2000 by *Games* magazine. Certainly OCTI is an original game that is very enjoyable to play. Although many abstract games come

and go very quickly, I have a feeling that OCTI will not soon be forgotten.

Published by Great American Trading Company, 90 Willow Springs Circle, York, PA 17402, USA
http://www.gatco.net or http://www.octi.net

Bosworth

Invented by Mark Alan Osterhaus

Bosworth is a game played on a 6x6 board minus the corner squares with cards representing Chess pieces. Most of the play takes place in the central 4x4 region, the outer squares being "field camps" from which the players bring their cards into the game. The game can be played with 2, 3, or 4 players. When two people play, which is the version we tested, they control field camps on opposite sides of the board.

Each player controls a deck of 16 cards which correspond exactly to the 16 Chess pieces. At the start of a game, each player puts a pawn on each of the four squares of his field camp. The remainder of each player's deck is shuffled and he draws a hand of four cards. On every turn a player must move a piece, fill any empty spaces in his field camp with cards from his hand, and then replenish his hand from the stock. The movement of the pieces follows Chess rules except that a pawn may also capture diagonally backwards. The objective of the game is to capture the opposing king(s).

The Bosworth game mechanism works well and it can give rise to interesting tactical situations. Strategically, however, it seemed to me that a player should always wait until the end before entering his king. Perhaps the game would be improved by stipulating that the starting position in the field camp should be a king and three pawns. I mentioned this to the inventor, who replied that choice of when to enter the king was the major strategic interest in Bosworth. I am not convinced, but in all honesty I have not played the game enough to pronounce definitely on this point.

In conclusion, Bosworth is quite a fun game to play, and the board and cards are nicely produced. The most interesting point about the game for me, however, was the possibility of applying the same mechanism to other Chess-type games. How about Bosworth Shogi, for example, or Progressive Bosworth?

Published by Out of the Box Games, 2722 Oakridge Avenue, Madison, WI 53704, USA
http://www.otb-games.com

Pentagonia

Pentagonia is Nine Men's Morris played on a board with three nested pentagons rather than squares and with 15 pieces per player. The only other difference is that the third, or jump, phase of the game starts for a player when he is reduced to five pieces rather than three.

Pentagonia is not a very original game, which is not necessarily a bad thing: it depends on whether the adjustments to the rules of the existing game have produced a superior variation.

The larger board and greater number of pieces may well give greater scope for strategic development. This is just a guess as I do not know Nine Men's Morris well enough to make an accurate comparison. However, I have never been happy with the jump phase in Nine Men's Morris because it can give the losing player such great flexibility of movement that he can quickly reduce the material gap. Assuming this to be a problem with Nine Men's Morris, it would be even more so with Pentagonia because the jump phase starts at five pieces rather than three.

The game is produced with a sturdy board and attractive glass pieces. Die-hard fans of Nine Men's Morris may well enjoy this game.

Published by Saskatchewan Internet News Ltd., 216 Avenue E. South, Saskatoon, Saskatchewan, Canada, S7M 1R9
http://www.pentagonia.ca

Book Review

The Complete Mancala Games Book

By Larry Russ

Marlow & Company, New York, 2000, $14.95

This is a new edition of a book first published by Larry Russ in 1984. It is divided into three parts, corresponding to two-, three- and four-row Mancala, respectively. The section on three-row Mancala is of necessity the smallest, containing only one chapter. The four-row section has two chapters, covering games in which the pieces are removed from the board and games in which the pieces always remain in circulation. The two-row section is divided into a number of chapters along largely geographic lines. Wari has a whole chapter to itself at the start of the book in order to give a thorough introduction to Mancala ideas and terminology.

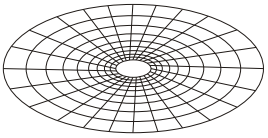
Altogether I counted 114 different games, although many of these are minor variations on a few distinct types of game. I would guess there are about 20 significantly different Mancala games presented in this book. There have been other collections of Mancala games published, notably in *A History of Board Games Other Than Chess* by H.J.R. Murray. Murray, however, was not a player of the games he described and so many of his descriptions are incomplete or unplayable. This is not the case with Larry Russ's book: the rules are clearly presented and easy to understand, and all the games are playable from Larry's description.

. So far, so good. There is, however, very little cultural or historical background given in the book, which tends to make it rather dry. It would have been more interesting, to my mind, had there been more of a sense of the games being embedded in an historical or cultural context. It would have been nice, for example, to have a map graphically demonstrating the geographical extent of the different Mancala game families or to have an outline of a theory of the origin and spread of Mancala games.

The other thing missing from the book is any reference to strategy or tactics or any comparison of the relative merits of the various games in this regard. Wari and Bao, for example, are sophisticated and serious games, with tournaments held and, I believe, professional players. The only mention of strategy and

tactics I could find in the whole book is an elementary Wari endgame.

On the other hand, as a catalogue of a large number Mancala games, with good, clean, playable rules for each, it fulfills its purpose admirably. It is an essential addition to any game player's library.



Games on the Internet

Of the many types of website devoted to games, one of the most interesting is that put together by the lone afficionado as a labor of love. Mark Thompson's site is one of those. It can be found at http://flash.net/~markthom/html/abstract_games.html.

Mark is obviously a lover of abstract games. He gives information about a number of little-known games, some of which I had not heard about, such as Outwit and Reed's Game. Mark also describes several of his own creations as well as a very colorful game called Capriccio, invented by his friend Larry Wheeler.

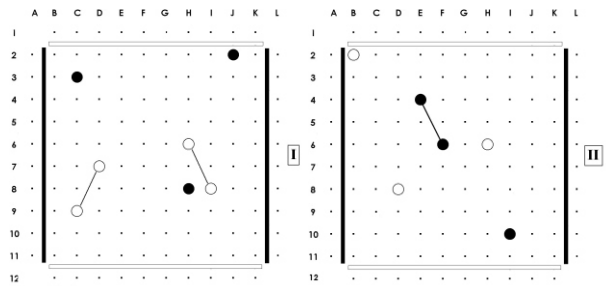
The Capriccio board is made up of six strips of eight squares, each strip a different color, making a 6 x 8 rainbow-colored board. The players have twelve pieces each, two of each type of six colors corresponding to the colors of the board. Each color represents a different type of movement. The crucial point is that a piece moves not according to its own color, but according to the colors of any friendly pieces on the strip the same color as the moving piece. Capture is by replacement. The objective is to immobilize your opponent, which turns out to be rather a good objective given the movement rules. Larry sent me a set so that we could test this game. The movement rules take some getting used to--it feels like the mental equivalent of simultaneously patting your head and rubbing your stomach. Presumably this feeling of dislocation will pass. The game does lead to interesting tactical situations and it is worth a look. Larry is happy to take enquiries at lwheeler@valise.com.

Mark Thompson is also involved with The Games Café, which is the newest, and to my mind the best, online games magazine. The Games Café has a number of prominent game personnel, including director Burt Hochberg, a former editor of *Games* magazine. Material in the other online magazines tends to be dominated by reviews, but The Games Café carries a wider selection of articles, including puzzles and philosophical musings. It can be found at http://www.thegamescafe.com. ■

"Let me say this one thing about chess to those who do not play it: a blind man can hear something of a football match, but he can never quite estimate the vigour, the speed or the skill of the players and so can never quite realize the excitement of the game. Watching a game of chess we are all blind; for, except a few whose imagination serves as very strong glasses to see into the minds of the players, we cannot see the exciting thoughts that flash rapidly to and fro, until a move is made, placing something visible occasionally before us, as the boom of a football kicked into the goal comes now and then to the ears of the blind man."

While the Sirens Slept, Lord Dunsany

Mini-Twixt Puzzles by David Bush



Black to move and win — White to move and win

See page 9 for rules of Twixt.
Solutions on page 21.

Kyoto Shogi -- Part 2

(See Abstract Games *Issue 1 for the rules.)*

In this, the second part of the Kyoto Shogi story, I will attempt to illustrate some characteristics of and approaches to the game, touching on where they coincide with or differ from the typical features of normal Shogi. As a medium for this, I am presenting the middle/endgame of a game played about a year ago by a friend and myself. Both of us were experienced players of Shogi (and in my own case Chess and other Shogi variants), but beginners at Kyoto Shogi. Consequently our play shows a strong Shogi influence, often appropriately, sometimes perhaps not. I am not intending to give anything like a complete analysis of the play—in fact I will several times make unsubstantiated assessments of variations that I discuss. Instead I will try to show the kinds of possibilities that players of Kyoto Shogi can expect to encounter. In consideration of those who have not yet made themselves a set, I will try to keep the notes within reach of the diagrams.

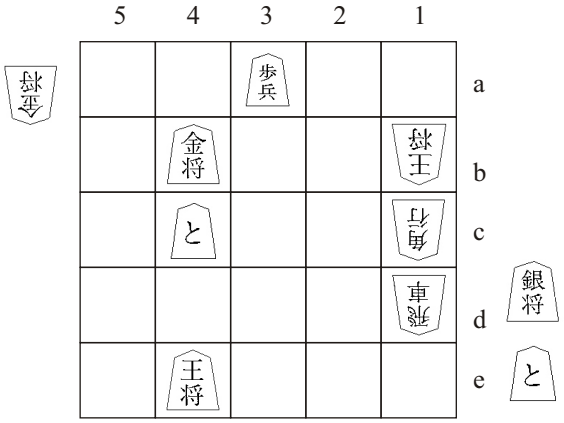


Diagram 1

We join the game at the position in Diagram 1. I was conducting *gote*. *(The Japanese name for the second player to move, the descending pieces in the diagrams, sometimes referred to as white. The first player to move, or black, will likewise be referred to by the Japanese term of* sente *-- Ed.) Sente*'s initial attack has resulted in the gain of a piece, but as the extra piece has no available move we can consider the advantage to be only half a piece. In Chess if a player wins a piece the advantage will be the opponent's total pieces plus one; in Shogi, because pieces going into hand remain in play, the advantage is the opponent's pieces plus two. In Kyoto Shogi the situation is basically as in Shogi, except for the case when a piece no longer has a move. These half pieces are not just immobile pieces—they can obstruct the pieces of the player they belong to and can be targeted by the opponent. In short, they can be an equalizing factor.

Sente's pieces at present hold no menace for *gote*'s king and are out of touch with their own king—they are in effect out of play. I have just dropped my rook on 1d, threatening mate, in an attempt to drum up a counterattack. From Diagram 1 play proceeded as follows:

22. T-4d=L Bx3a=S
23. Gx3a=N R*4a
24. T*3e Rx3a=P
25. B*3d Rx3d=P
26. Tx3d=L (Diagram 2)

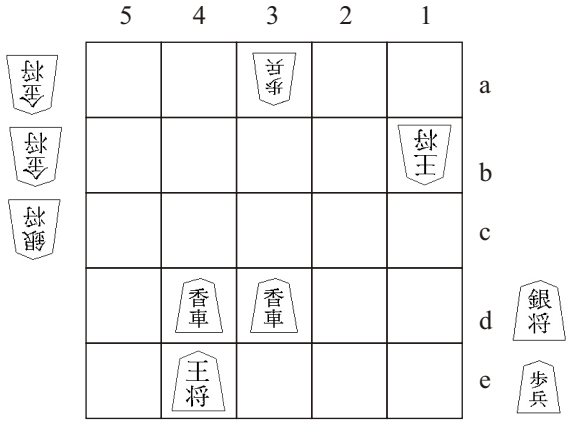


Diagram 2

Since our previous diagram, *sente* has returned the half piece while at the same time reactivating the remaining pieces. It is a beautiful position, quite out of keeping with the kind of shapes one expects to play in straight Shogi. From Diagram 1, black could have defended by dropping a piece on 4d and attempting to move the king up the fifth file. The strategy of entering the opponent's position with one's king is a significant weapon in normal Shogi. In Kyoto Shogi it is also conceivable. However, Shogi pieces always have a move and can thereby protect their king, whereas in Kyoto Shogi pieces as they advance up the board have a tendency to run out of moves, making them vulnerable to attack and ineffective as defenders. After 23...R*4a, another way of playing existed to maintain the half piece advantage: 24. B*3d Rx3d=P, 25. Lx4a=T (Diagram 3).

Comparing the positions which resulted from the different strategies, we might say that *sente*'s pieces are more active and his king is better protected in Diagram 2 than in Diagram 3; *gote*'s *hifu* is more shakily situated in Diagram 3 than in Diagram 2. But what about the pieces in hand? In Diagram 3, *sente* has one more piece in hand than in Diagram 2, giving a total of 127 possible moves compared with 89 moves available in Diagram 2; *gote* has a piece less in hand in Diagram 3, but the number of types of piece in hand is the same, giving 86 moves in

either case. (Number of pieces is likely to be more important than variety of pieces, but this is another thing to keep in mind.) This apparent advantage in mobility might be a significant factor in the choice of strategy; one has to bear in mind how free one is to exploit the range of moves. It is sometimes difficult to tell whether or not a piece is active in Kyoto Shogi. In normal Shogi, a piece's activity arises from a combination of its position and its mobility—in Kyoto Shogi a piece does not have mobility in the same sense, as one move can destroy the piece's functionality.

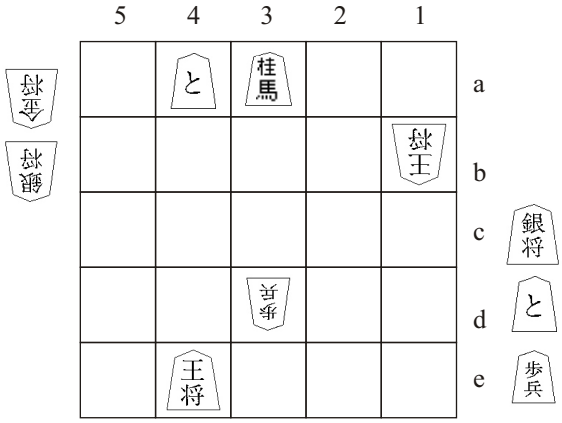


Diagram 3

The only piece that is immutable and always present is the king. Given the small size of the board and number of pieces the king takes on an important role in any attack. For example, if *sente* has a king on 3d and *gote* a king on 3a, with all the original pieces in the respective hands, the side to move can mate; *sente* can mate with only three pieces in hand. In Diagrams 2 and 3 both kings are one square from the corner. My feeling is that *sente* has a slight advantage through horizontal rather than vertical displacement.

Play from Diagram 2:

26…. B*2c
27. R*3c P-3b=R
28. Rx3b=P G*3c (Diagram 4)

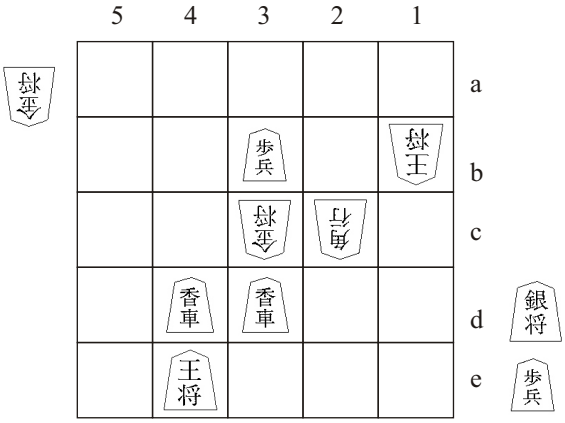


Diagram 4

Over these five moves the players had an average of 61 available choices per move. I am not going to go into any unrealized alternatives. I will content myself with remarking that the moves selected show a Shogi influence in their economy. In other words, the players try at each move to answer the opponent's threats whilst creating their own and as far as possible try to preserve pieces in hand. Furthermore (on choosing moves), it should be borne in mind that Kyoto Shogi is a game and as such one plays it to have fun. This fun arises not from the game itself but from the creative efforts of the players. Apart from being a game, Kyoto Shogi is also a social event: the player's responsibility to create "fun" reaches beyond himself to the opponent and any audience, so, unless one is playing just for money, one endeavors to choose the moves and plans that will lead to difficult and exciting positions.

From Diagram 4 there are plenty of viable moves. I leave the reader to consider the position at leisure. Perhaps *sente*'s actual choice is again Shogi influenced. It provides a broad defense, keeps an eye on the escape down the board by *gote*'s king, and creates the potential of a recapture on 3d with check.

Play from Diagram 4:

29. S*3e Gx3b=N
30. L-4c=T (Diagram 5)

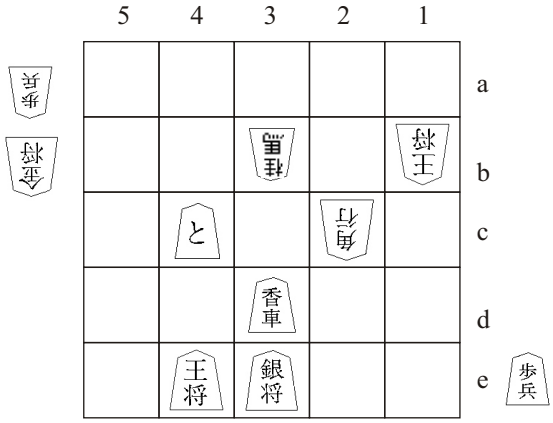


Diagram 5

The game appears to be approaching a crisis. The potential energy of *sente*'s pieces is becoming manifest, whereas *gote* is in danger of losing pieces or finding his pieces on the board reduced to ineffectuality. An obvious move for a Shogi player would be 30....R*4a. The continuation 31. K-5d N*3a, 32. Tx3b=L N-4c=G, 33. K-5e Bx3b=S (Diagram 6) can lead to some lines interestingly illustrating the nature of individual pieces. I have heard the opinion that the *hifu* is the weakest piece and the *kyoto* is the strongest; it has otherwise been expressed that the *hifu* is the most difficult piece to manage. I think that matters are not so simple. Considering the diversity of function employed over such a concentration of pieces, to me it is remarkable how exchangeable the pieces are. The relative strength of pieces is situational. As the pawn's move is included in the rook's it might seem to be a special case. However, the bishop almost covers the silver so there is a distinction related to the enervation of so-called major pieces. (Note: the *ginkaku* is the only piece that cannot run out of moves.)

The threat in Diagram 6 is T*5d mate. If, for example, this is defended against by 34. R*5b, *gote* can play 34.... R-5a=P, 35. R-5d=P P-5b=R (natural *hifu* play); or if *sente* tries 34. G*4e, *gote* plays 34…L*5c, 35. P*5d Lx5d=T, 36. Gx5d=N R*4e, 37. Kx4e G-5c=N, 38. K-5e N-4e=G (natural *kinkei* play).

Against 31....N*3a *sente* could try 32. R*1e B-1d=S, 33. L-3c=T, or instead of 31. K-5d in reply to 30...R*4a (from Diagram 5), 31. P*3c or P*4d. Each of these possibilities leads to an entirely different position. In fact, I don't remember if I considered 30….R*4a. As this is not normal Shogi, in reality Rx4c=P is not a pressing threat. The main threat may be G*5c followed by Rx4c=P, but this seems a little relaxed in this situation. In a well-matched game of Shogi, the endgame becomes a race with both sides

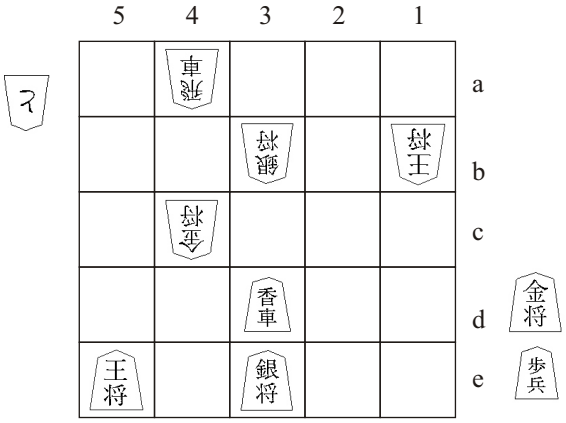


Diagram 6

capable of winning, each trying to be the first to do so. In Kyoto it often feels as if both sides are losing with each trying to be the last to do so. My tendency was to block the king's escape via 5d and threaten mate by 30.…R*5a. The problem is that after 31. R*5d Rx5d=P, 32. Kx5d I seem to be achieving *sente*'s aims for him. Accordingly I chose

30.… R*5c

in order to meet R*5d with Rx4c=P and having considered two possible defensive attempts after the following capture and reply

31. Tx5c=L G*4c

I threaten 32....N-4d=G, 33. Sx4d=B, Bx3d=S, followed by mate. I was happy with the continuation 32. R*1a Kx1a, 33. R*4a K-2b, 34. Rx4c=P Bx3d=S, 35. Kx3d L*3c, 36. K-4e Lx3e=T, 37. Kx3e S*2d, 38. K-4e R*4d, 39. K-5e S-3c=B (Diagram 7)

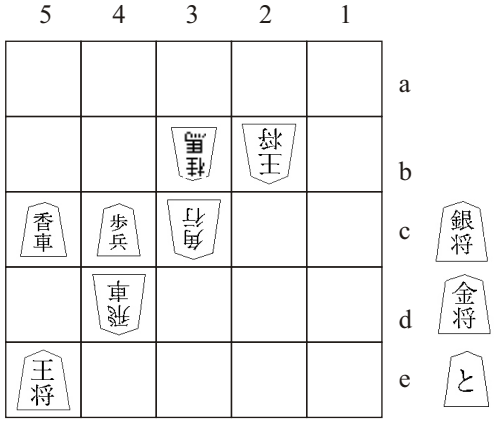


Diagram 7

Sente would have no defense to the threat of discovered or double check followed by N-4d=G mate. Also with 32. R*5d K-1c, 33. K-5e Bx3d=S, 34. R*1b Kx1b, 35. Sx3d=B Gx3d=N (Diagram 8) *sente* has no defense to the many threats. However, my opponent chose another possibility:

32. R*3c

Defending the threats and threatening the threateners. Now if I take the rook my knight is ineffective and *sente*'s king can escape at 5d. Anything else seems too slow. I tried to struggle, but it was no good. My opponent concluded the game nicely:

32.… Bx3d=S
33. Sx3d=B K-2b (Diagram9)
34. B*3a Kx3a
35. Rx3b=P Kx3b

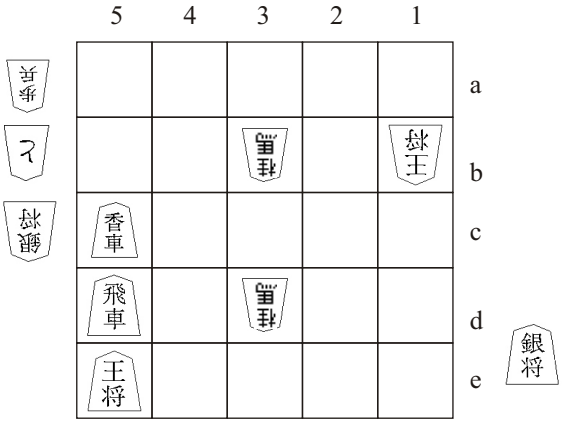


Diagram 8

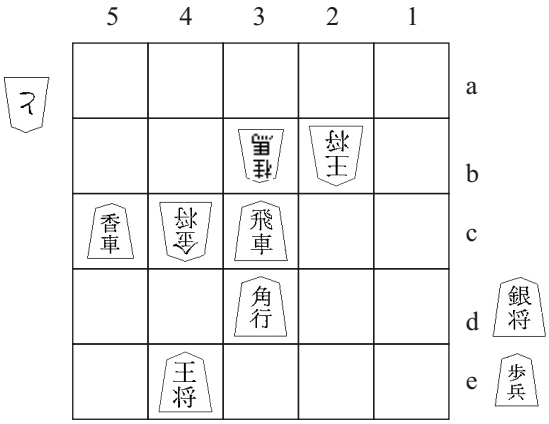


Diagram 9

36. Bx4c=S Kx4c
37. G*3d K-3b
38. G*3c Resigns (Diagram 10)

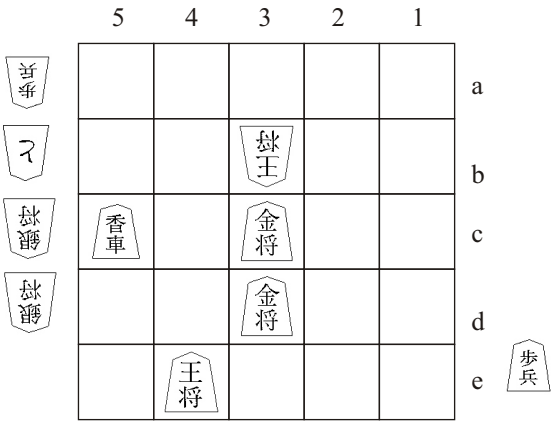
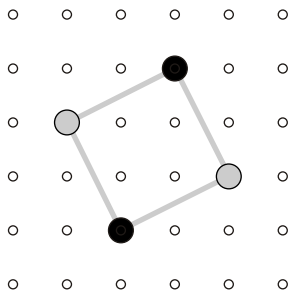


Diagram 10

It will be mate at the latest on move 41.

Kyoto Shogi is played on a small board with very few pieces, yet because we can choose the value by which we use the pieces in hand there are often very many moves available. This feature is still within the frame of Shogi. The real nature of Kyoto comes out with the moves on the board and their consequent transformations. This feature leads to strategic problems that even in post-mortem analysis are undecidable. ■



AN INTRODUCTION TO TWIXT

by David Bush

Twixt was one of the first connection games. It was invented by Alex Randolph in the early 1960's. The board is a 24x24 square grid of holes, minus the four corner holes. For this article, one player will be referred to as "White," and the other as "Black." (Many Twixt sets use different color schemes; in the USA, for example, most sets use red versus black.)

The holes along the four edges are referred to as "border rows." The "top" and "bottom" rows are White's border rows, and the "left" and "right" border rows are Black's. These border rows are delineated from the rest of the board by borderlines, as shown in the accompanying diagrams.

Each player has a collection of pegs and links of his color. Approximately 50 pegs and 50 links for each side, a total of 200 pieces, is an ample supply.

White moves first, then play alternates. Each move consists of the following steps:

1. Place a peg of your color in any vacant hole except a hole in your opponent's border rows.

2. Place as many legal links as you wish between pairs of pegs of your color. You may place a link only between pegs which are at opposite corners of a 2x3 rectangle, like a knight's move in Chess. No link may ever cross another link, even one of the same color. You are allowed to remove as many of your own links as you wish prior to placing any links. If you do not have two pegs on the board a knight's move apart, you may not place any links on that move.

Usually, after a peg is played, all possible links to that peg are added. Links are rarely removed, but sometimes you need the "elbow room."

(I should add that the official tournament rules of the World Twixt Championship, held in London, England each August, state that you must remove any links you wish to remove, *before* you place your peg.)

After White makes the first move, Black has the option of either responding normally or swapping sides. If sides are swapped, the player who moved first as White is now Black, and makes the next move. This rule makes the game more balanced, as otherwise White would have a very strong first-move advantage.

The objective is to connect your border rows with a continuous chain of linked pegs. If neither side can complete such a chain, the game is a draw. In this article we will examine a game which results in a draw, although draws are quite rare.

Each move is indicated by the coordinates of the hole where the peg is placed. All links that can be added to that peg, without removing other links, are automatically added. After the peg coordinates an asterisk * is shown for each such automatic link. None of the moves in the game itself involve link removal, but one of the variations examined does involve removing a link. I will explain the syntax for those moves when we get to them.

Klaus Hussmanns has been the reigning World Twixt Champion for two years now. We collaborated on the following analysis. Any errors, however, are mine alone.

Richard's PBeM Server Twixt game 1085

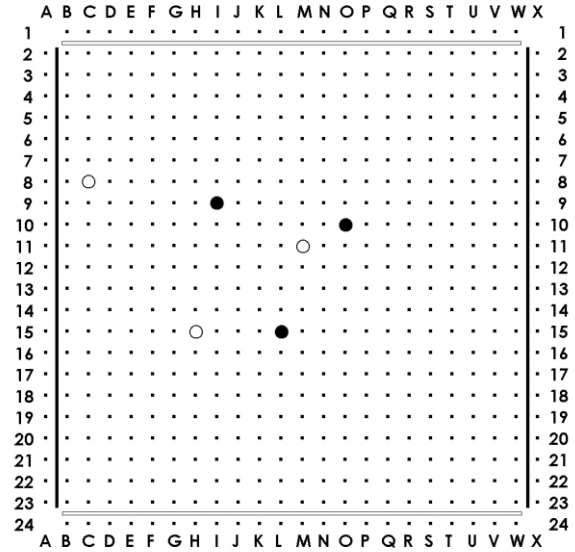
White: David Bush Black: Klaus Hussmanns

1. C8 O10

Klaus chose not to swap. If I had played 1.L12, that would have been a very bad move because Klaus would certainly have swapped sides with a winning position. If I had played 1.B1, that also would have been a bad move because Klaus could have responded by *not* swapping, instead playing almost anywhere in the central region, with a strong advantage. I really do not know if Klaus should have swapped 1.C8 or not, but either way the advantage is small.

2. M11 L15

3. H15 I9 (diagram)



The stage is set for the battles to come. Black is threatening to build a chain from I9 to O10 or L15 on the right, and from I9 to the left border row, either above or below my C8 peg. He might also connect L15 somehow to the left wall without going through I9. He might even build a chain that completely circumvents all three pegs he has placed so far; for example, he might cut across close to the top edge, or close to the bottom edge. In the opening what matters is influence and potential threats rather than building your bridge in one specific place. For my part, I am also trying to make as many threats as possible, but I also need to pay attention to what

Klaus is threatening. If I do not get in my opponent's way, he will easily be able to build his chain. Right now Black's strongest threats are those pertaining to his I9 peg. I might have tried to block him on the left, for example with 4. G10, but then Klaus would have responded 4....H12, with a local advantage. For example: 5. F13 E9, 6. E11** G8**, 7. D10* D6, 8. D5 E4*, 9.C7* C5*, 10. E6* F6**. I chose to try to block Klaus on the right instead:

4. K10* H7*

An interesting alternative here is 4....K8*, and then 5. N9* N8*, 6. M7* I13. This would have the effect of making Klaus' L15 peg very strong. It would be very difficult for me to get past it on either the left or the right. I might have answered 4....K8* with 5. I11* instead, leading to a very complicated (and very different) battle. Perhaps one day Klaus and I will explore this variation.

5. O12*!

I was lucky that this turned out in my favor. White will be able to connect to the top somewhere.

5.... M7

This peg is on the "crucial diagonal" which leads to W2; to get past it, I have to make a double threat.

6. T6

The variation 6. M8 K8**, 7. O9* O6*, 8. Q8* Q5* is good for Black; for example, 9. U6 S7, 10. T9 T5*, 11. T4* S3*, 12. S2* Q11*, 13. N10** R9**, 14. U11* T13.

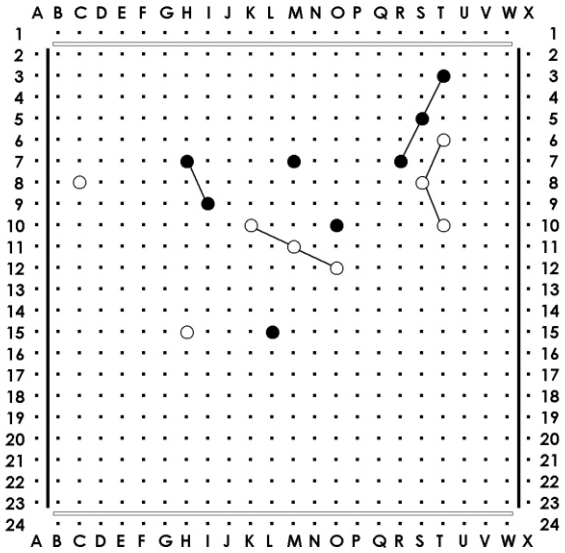
The point behind 6. T6 is that I am threatening to cut through now with L8*, as well as threatening to cut straight down on the right. If 6....Q7, 7. S8* S10, 8. R9 threatens L8* or Q11**. Klaus finds a better move:

6.... R7!

7. T10 S5*

It looks like 7....S9* would have led to a similar full-board position after 8. R9*.

8. S8** T3* (diagram)



Klaus played 13* instead of U4* to maximize his connection potential to his M7 peg. Now I cannot punch through with 9. O7 because of 9....P8**, and then if 10. M8* K8**, or if 10. M6* L5*, 11. N9** N4*, 12. P5* P3*, 13. Q3* R2**.

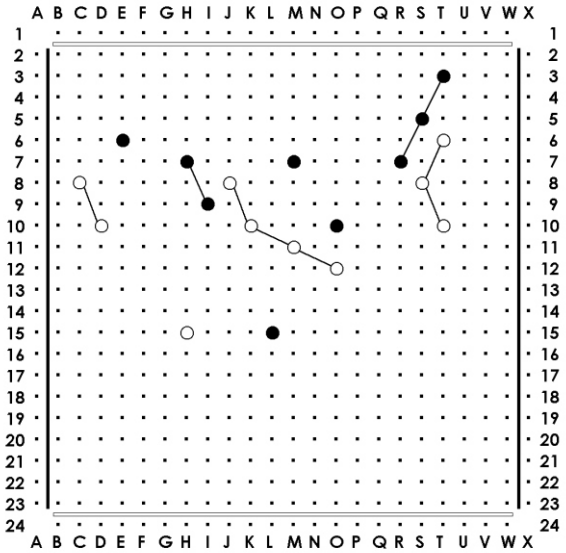
After 8....T3* I was sure I could force a connection to the top border from one of three places: the C8 peg, or the K10/M11/O12 group, or theT6/S8/T10 group. I was correct about this, but not in the way I thought. In any case, this is the crucial position of the game. I had to realize that just connecting to the top is not enough.

9. D10*?

Too timid. After the game I thought I should have played 9. E13, but Klaus pointed out to me that this fails against 9....D6! Now I have another preferred move: 9. C12! I will explain the reasoning behind this move when the battle shifts to the bottom half.

9.... E6

10. J8* (diagram)



10. G5 looks better; if 10....Q15, 11. D6*, or if 10....F8**, 11. J8*, and now I need only worry about connecting two groups to the bottom (J8/K10/M11/O12 and T6/S8/T10) instead of three. For this reason maybe 9....Q15 would have been better than E6.

Now is a crucial moment for Klaus. As I said before, I can force *one* of my three linked groups to connect to the top. In order to win, therefore, I have to be able to force *all* three groups to connect to the bottom somehow. From a strategic point of view this is not good for me.

10.... J6*?

I believe this throws the win away. Instead, 10....Q15! would have immediately attacked my weakness: my position on the bottom half of the board. All Klaus has to do is stop one of my three linked groups from reaching the bottom; then he allows only that group to connect to the top, and he has a chain from left to right. For example:10....Q15!, 11. R13 O14*, 12. Q13* J16*, 13. F14* I18*, 14. F18 H20*, 15. E20* J11*, 16. J12* I13*, 17. I14* G14*, 18. J14* K6*, 19. G5 I5**, 20. D6* E13* (diagram)

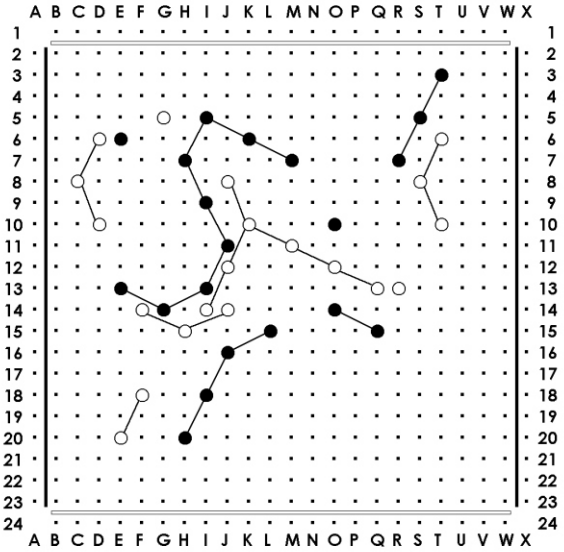
White has many other choices in this variation. For example, S16 is possible at any point, trying to cut Black off on the right. However, Black's chain from L16 to H20 is so large that White could not prevent it reaching the right border. (Since that local battle actually occurred during the game, I refer you to later analysis.)

If White had played 9. C12 instead of D10*, then 10....Q15 would not have worked: 9. C12 E6, 10. J8* Q15, 11. R13 O14*, 12. Q13* J16*, 13. E17 I18*, 14. E20 J11* (14....H20* is not a threat here), 15. L13*, and now either

15....K13**, 16. N17 N16**, 17. S15* and White's N17 peg will support S15, or

15...N16**, 16. J14** K6*, 17. G5 I5**, 18. D6* F8**, 19. E4** E10*, 20. E13*.

The problem with 10....J6* is that by "solidifying"



the battle on the top of the board. Black is making my task of the bottom of the board easier. Now I have to worry about connecting only two groups (J8/K10/M11/O12 and T6/S8/T10) to the bottom, instead of three.

10....K6* would also have been a mistake. I would simply reply 11. G5 (or 11. H4) and again I would have to connect only two groups to the bottom instead of three.

Nevertheless, I had a moment of panic after 10....J6* when I realized that my intended 11. P5? loses to 11....P8**, 12. N6* K8**. Fortunately, I found the correct move in time:

11. O6!

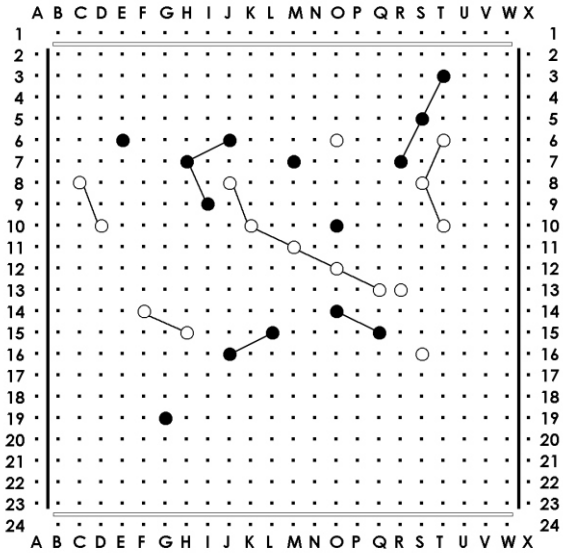
(If 11. M5 L5**, 12. Q7* P3!; if 11. Q7* P5, 12. M5 L5**, 13. O4* O7*; if 11. N6 L5**, 12. P5* Q5*.)

Klaus sees that 11....P8**, 12. L7* L5**, 13. N8** N4*, 14. P4* is hopeless (as is 11....P6*, 12. M5*), so he switches to the bottom half:

11... Q15!

A strong move, even though it may be one move too late.

12. R13 O14*
13. Q13* J16*
14. F14* G19
15. S16 (diagram)



At this point I felt confident I would win. My plan of attack was a basic "pincer movement." In other words, I would play either J19 or K18 at the right moment, threatening to cut through between Black's J16 and G19 pegs, and at the same time, supposedly, providing enough support to my S16 attack to force a connection to the bottom border. The tactics, however, turned out to be trickier than I had expected.

15.... T16

Not 15....R16 because of 16. Q17* threatening R15**. This is why I played 13. Q13* instead of 13. Q11**.

After the game, Klaus wondered if 15....R20 would have been an improvement. We concluded that after 16. T18* S22*, 17. P18 M22 (or 17....P19*, 18. O16* N18*, 19. K18), 18. J19 I would have won.

16. U15* R17**
17. T17*S21
18. R19 U20*

18....S19* does not work because of 19. U19* U22*, 20. V21* W23*, 21. T20**.

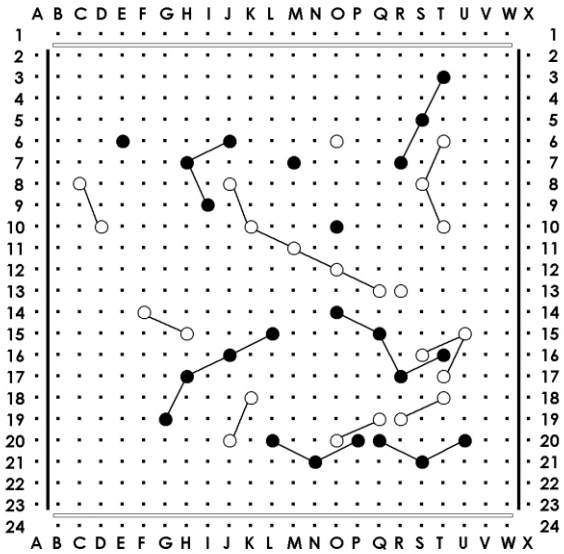
19. T18*

A few moves later I would berate myself for this move, thinking it threw away the win. But my "improvement" 19. S17* would have lost to 19....R20, 20. Q21* Q22**.

Also, 19. R18* fails against 19....P20, 20. O20 Q18*, 21. Q17* N21*.

19.... P20
20. K18! L20
21. J20* H17**
22. O20 N21**
23. Q19* Q20*!(diagram)

The move I missed. We are headed for a draw.



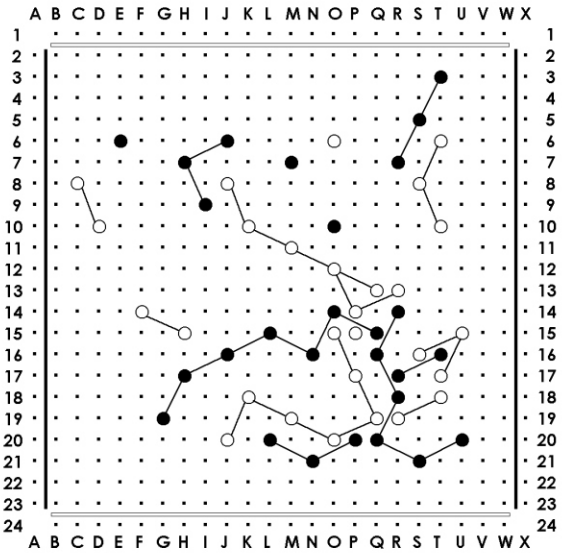
24. M19 R18
25. P17* R15

25....Q16* instead would have led to an interesting mess.

Here is the syntax for moves that involve link removal: after the peg coordinates, place a minus symbol - followed by any chain or chains of links to remove; the forward slash / is used as a delimiter between the pegs of a chain, and if more than one chain of links is removed, commas , are used as delimiters between each chain; then place a plus symbol + followed by any chain or chains of links to add.

If, therefore, 25....Q16*, 26. O15* N16**, 27. P14**

R14-Q15/R17+Q16/R14 (i.e. place a peg at R14, remove the Q15/R17 link, and add the Q16/R14 link), 28. P15 (diagram)



Black's only way to win is to connect his G19...Q15 chain to either the right border or to his R14...U20 chain somewhere.

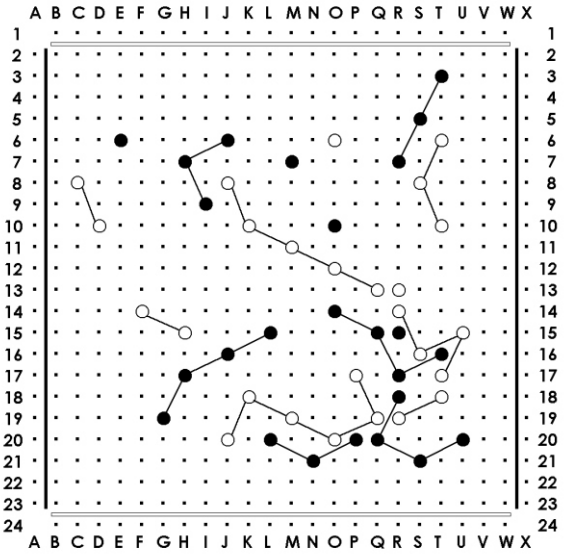
28....S12* looks strong, but after 29. R11** Black has a problem: any path that would connect the two groups via S12 would have to loop around itself--there is no way to form a continuous chain via S12. If 29....S14, 30. T13* U13*, 31. T12, Black can connect to the right border, but not to the left border.

If 28....T13*, 29. S14* Q10, 30. S12**, and my O6 peg is still working.

Draws are frequently messy, but I claim that White can block any threats Black might create here. For example, if 28....Q18, then 29. R20.

Returning to the game:

26. R14* (diagram)



Klaus agreed to a draw here. His intended S17 does not give him a tempo because I could answer with U19*, threatening V21* and snatching the tempo right back.

I hope this game gave you some idea of the depth and beauty of Twixt. Happy Twixting! ■

David Bush lives in Lexington, Virginia, where he is learning about programming (when not playing Twixt!). He has been a keen player since 1967 and is one of the strongest Twixt players in North America. In future issues David will be writing about Twixt tactics and strategy in some detail. He has also written about Twixt in the Mindzine section of the Mind Sports Olympics website at http://msoworld.com/. David can be contacted for questions and comments at twixtplayer@yahoo.com. Twixt can be played through Richard's PBeM Server, which has a series of Twixt puzzles by inventor Alex Randolph on their website at http://www.gamerz.net/~pbmserv/Twixt/puzzles.html. Although German company, Kosmos manufactures and sells Twixt sets, it is usually easy to buy an inexpensive used set on the eBay website.

The concept of connection has been present in the game of Go for thousands of years. In Go, however, it is a local goal rather than a global objective. Games with connection as the overall objective were only developed in the last 60 years. It is amazing to me that such a simple game concept only recently found full expression. Connection subsequently became one of the great abstract game themes of the twentieth century, and many game inventors developed their own interpretation.

Hex was the first of the connection games, invented in 1942. Many other games followed, Twixt among them. Closer in conception than Twixt to the seminal game Hex is the Game of Y, which can in fact be regarded as a generalization of Hex; Poly Y is a further generalization of the Game of Y; both these games are discussed in the classic book Mudcrack Y & Poly-Y *by Craige Schensted and Charles Titus (Neo Press, 1975). Poly-Y is said to be Go-like in feel. Although not a pure connection game because it has a mixed objective, Christian Freeling's Havannah deserves special mention because of its highly-developed and interesting strategy.*

The development of connection games is clearly related to the branch of mathematics called topology since a winning position consists of an arrangement of pieces that is, in a sense, " topologically invariant." In other words, the shape of the path making the connection is irrelevant as long as the connection exists. In earlier games in which the objective was to obtain a certain configuration of pieces this was not the case. In Gomoku, for example, it is not enough to obtain a line of five connected pieces, but it must be a straight *line.*

Other games in which the objective is to obtain a topologically invariant configuration of pieces are Lines of Action and Trax. At a stretch, both of these games may be classed as connection games.

Beginners may find the foregoing Twixt article to be quite a challenge. The following article on Hex by Cameron Browne is a gentler introduction. Cameron lives in Brisbane, Australia, where he has a wife and two cats; he works as a computer graphics researcher in Sydney. He has traveled extensively in the Australian outback, remarking that he was once forced to eat his own camel(!). Cameron has been an avid Hex player for 15 years. He has written a book called Hex Strategy *due to be released in May 2000 by AK Peters (ISBN 1-56881-117-9). Although Cameron will be presenting some material in this magazine that is not contained in the book, he obviously is able to discuss many topics in greater length and depth in his book.*

Jack van Rijswijck's website address is at http://www.cs.ualberta.ca/~javhar/hex/. It is a good place to start investigating Hex on the Internet; it contains links to a number of interesting sites. Once again, Hex may be played via Richard's PBeM Server. And so, onto Cameron's article .... -- Ed.

Hex Strategy

Part 1: Introduction and Basic Strategy

by Cameron Browne

This is the first in a series of articles about the abstract board game Hex. In this issue we look at the game's rules, its history, and some basic strategy. Upcoming issues examine key points of strategy in more depth, followed by a discussion of a simple algorithm that plays a surprisingly strong game of Hex, complete with C code. Hex puzzles relevant to the topics covered are included at the end of each instalment.

Introduction to Hex

Hex is an abstract board game that has fascinated mathematicians with its beauty and surprising difficulty since it was first invented over half a century ago. It is a seminal game that has inspired many variants over the years, some of which have achieved greater fame than Hex itself.

If a game's worth can be estimated by its strategic depth versus rule complexity, then Hex provides excellent value. It is extraordinarily complex yet with a rule set among the simplest of any game possible.

Rules

The Hex board is an *m*x*n* hexagonal tiling in a rhombus shape. 11x11 is the standard board size that we will focus on, although larger boards provide a richer game. Two players, Black and White, are assigned opposite edges of the board. The board is initially empty.

The rules of Hex are simple:

- *Players take turns placing a piece of their color on an unoccupied hexagon.*

- *The game is won when one player establishes an unbroken chain of his pieces connecting his sides of the board.*

A game can never end in a tie: if one player completes a connection between his edges, then the other player is prevented from doing so. Figure 1 illustrates a game won by White, who has formed a contiguous *chain* of pieces between his edges.

The player to move first has a huge (winning) advantage if he is allowed to make a strong opening play. An additional rule is often used to reduce this first move advantage:

- *The player to move second has the choice of swapping colors, effectively stealing the first player's move.*

This is called the *swap option*, and it's recommended that all games be played with this additional rule. There is no universally accepted starting color; either Black or White may start the game.

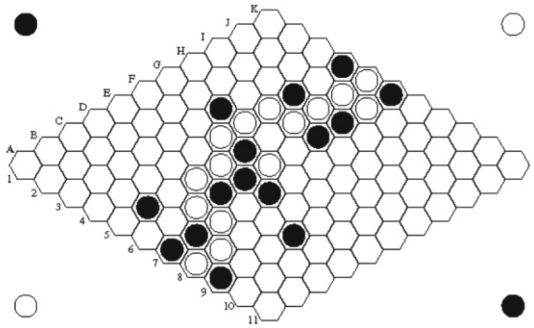


Figure 1. A game won by White.

History

Hex was first invented in 1942 by Danish mathematician Piet Hein, and was originally called Polygon. The same game was independently developed in 1948 by Nobel laureate John Nash, then a graduate student of mathematics at Princeton University.

Hex has always had a dedicated following amongst the mathematical community, and has been the subject of many worthwhile research papers. It was introduced to a wider audience with the publication of Martin Gardner's *Scientific American* article "The Game of Hex" during the late 1950s. Hex is currently enjoying another resurgence of interest and is becoming a popular game amongst the internet gaming community.

In terms of strategy, two aspects of the game are of particular interest:

- One player must win.
- First player has a winning line.

The first point is related to the fact that Hex is a generalization of the Shannon Switching Game. It is analogous to an electric circuit where one player (Cut) tries to break the circuit, or connection, while the other player (Short) tries to complete the circuit, or connection. At the completion of a game only one of these states can exist.

The second point derives from the first, and is based upon a *strategy stealing* argument proposed by Nash. Essentially, if a winning strategy exists for the second player, then the first player can win the game by stealing this strategy given that he has the advantage of an extra move.

The huge first move advantage is a flaw in the game that players have attempted to address with a number of superficial fixes. The swap option described above is the most satisfactory solution, and in fact adds a dimension of strategy to the game. It does for Hex what the doubling cube does for Backgammon.

Nature of the Game

Hex belongs to the class of *two-person zero-sum finite deterministic games of strategy*. David Parlett, in *The Oxford History of Board Games*, places it within the overall context of board games as a *game of linear connection* and describes Hex as a classic of its type.

Although it is known that a winning strategy exists for Hex, the strategy itself has eluded researchers, except for smaller boards. This is largely due to the extraordinary combinatorial complexity of the game. The study of Hex strategy is an attempt to reduce this complexity to a manageable level and tame the game's branching factor by pruning suboptimal choices from the game tree.

Estimating the strategic depth of a game is not as simple as describing the size of the complete game tree. As Robert Abbott points out in relation to his game Ultima, the depth of a game depends not so much on the *size* of the game tree as on *how far a player can see* down the game tree.

This concept of *clarity* essentially describes the amount of certainty with which a player can plan ahead and formulate strategies. Hex has excellent clarity: each piece is of uniform strength, the board is uniformly distributed, the goals of the game are well defined, and it's often possible to plan a dozen or more moves ahead with reasonable certainty.

Other Tilings

At its most essential, the Hex board can be described as a graph with connections between adjacent hexagons. This raises the intriguing possibility of playing the game on other surfaces such as semi-regular tilings, irregular tilings, or even maps, as suggested by David Book.

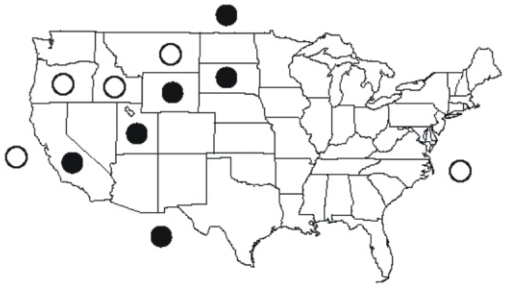


Figure 2. Hex played on a map of the contiguous United States.

Figure 2 shows a game of Hex played on a map of the contiguous United States. White's goals are the shores of the Pacific and Atlantic oceans and Black's goals are the borders Mexico and Canada. This map is not ideal: as can be seen Black has a distinct advantage and wins easily, and the game can theoretically be deadlocked as four states meet at one point.

The hexagonal grid is the optimal choice of playing surface for a number of reasons. It is regular and hence uniform in distribution, is the regular tiling with the greatest number of neighbors and hence connective potential and scope for strategy, and does not allow deadlocks to occur.

Now for some strategy….

Connectivity Is Everything

The concept of connectivity is central to Hex. Two pieces are said to be *n-connected* if they can be joined to form an unbeatable connection in *n* moves when considered in isolation. Pieces that are 0-connected are described as *safely connected* and other connections *unsafe.*

Non-adjacent pieces can still be safely connected as shown by pieces ***a*** and ***b*** in Figure 3. If Black plays in one of the empty points separating ***a*** and ***b*** then White can play in the other empty point next turn to complete the connection. Empty points such as these that provide an alternative route within a safe connection are called the *dual points* of the connection.

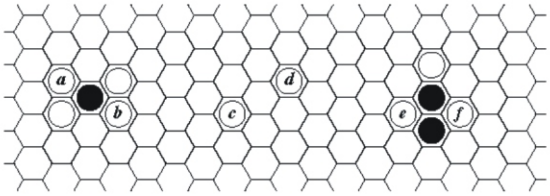


Figure 3. White's pieces are: 0-connected, 1-connected, and 2-connected.

Pieces ***c*** and ***d*** require one move by White to ensure their safe connection. Pieces ***e*** and ***f*** require two moves through the intermediate White piece at the top of the figure.

The golden rule of Hex is: *a player's position is only as good as the weakest link in his best connection across the board.*

Bridges

The simplest non-adjacent safe connection between two pieces is the *bridge* formation as shown in the right of Figure 4. This is the basic building block that a player will use to extend his connection across the board.

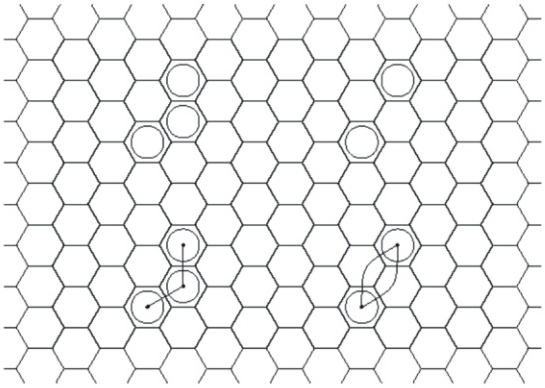


Figure 4. Adjacent and bridge pieces with links shown underneath.

For board analysis it is useful to show links between pieces explicitly. Links between adjacent pieces are drawn directly, and bridge links are drawn as two arcs through the connection's dual empty points.

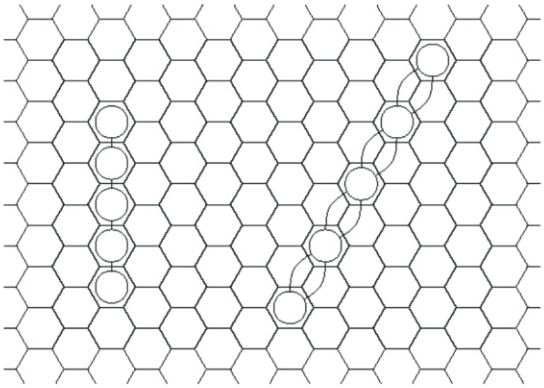


Figure 5. Expansion by adjacent moves versus bridge moves.

Bridges allow a player to expand a safe connection twice as fast as using adjacent moves, as can be seen in Figure 5.

Just as bridges contain dual paths between two pieces, more complex connections between groups of pieces and edges can be developed through the recursive growth of dual links as shown in Figure 6.

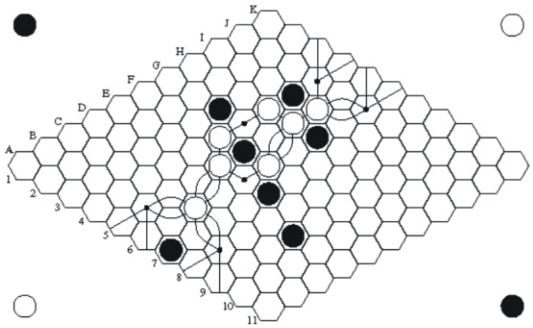


Figure 6. Completed game with 0-connected spanning path.

White's edges are safely connected by a *spanning path* across the board. Black cannot defeat this connection. This is the same game as that shown in Figure 1 after the fourteenth move. If both players are evenly matched there is no point in playing any further, and it would be prudent for Black to concede at this point and get on with the next game.

So when exactly is a game of Hex over? As soon as either player forms a 0-connected spanning path between his edges.

Forcing Moves

Safe but non-adjacent connections contain vulnerable dual points that may be exploited. If the opponent occupies such a vulnerable point, the player is obliged to play in its dual to preserve the connection. Such intrusions or *forcing* moves are the key to Hex's rich strategy.

The following example shows how forcing moves can wrest the initiative away from the opponent and win the game.

> **"Everything that can be invented has been invented."**
>
> Charles H. Duell, Commissioner, US Office of Patents, 1899.

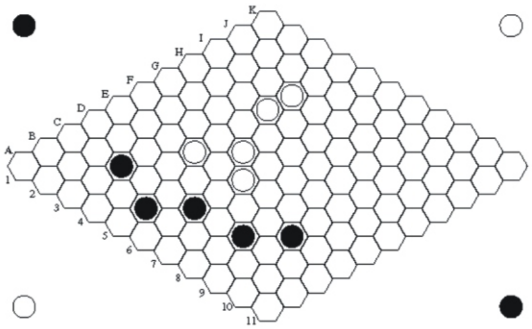


Figure 7. White to move.

The situation shown in Figure 7 looks good for Black. He has a 1-connected spanning path whose only weak link appears to be through empty point C7. What is White's best play?

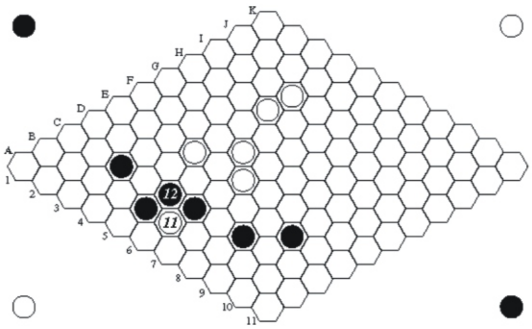


Figure 8. Move ***11*** forces reply ***12***.

Move ***11*** intrudes into one of Black's bridges and threatens to give White a 0-connected spanning path if he moves at C5. Black is forced to reply at C5 with move ***12*** to keep the game alive.

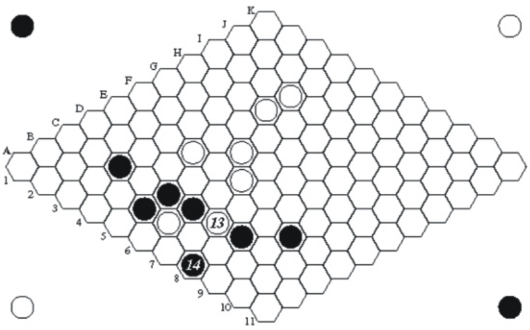


Figure 9. Move ***13*** forces reply ***14***.

White then moves in Black's weak link with move ***13***. Again Black is forced to reply with move ***14*** to avoid immediate defeat.

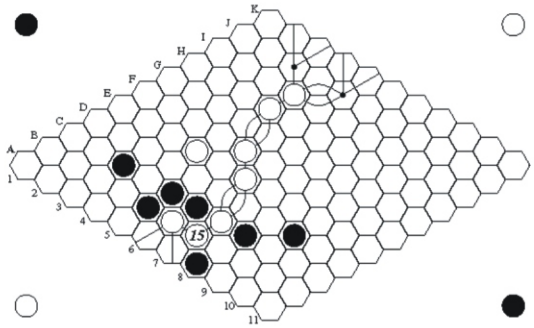


Figure 10. Move ***15*** wins the game for White.

Move ***15*** wins the game for White as shown by the spanning path in Figure 10. Forcing move ***11*** provided the stepping stone necessary to complete this connection.

As suggested by David Boll, the following options are available to a player when his opponent has just made a forcing move:

- Answer the forcing move and save the link,
- Give up the link and move elsewhere (if not a winning link), or
- Play a forcing move himself.

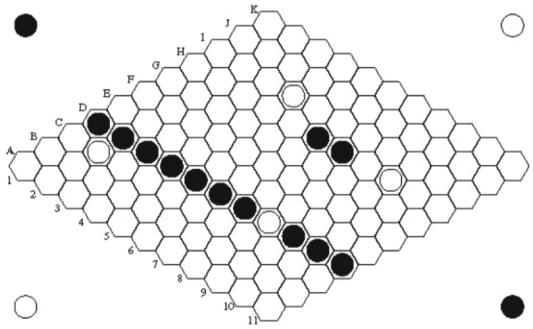
In general a forcing move should not be ignored unless the reply is a stronger forcing move itself or the threatened connection is not essential. When considering a reply to a forcing move, the player should first determine how important the link is to his overall connection and whether it can be abandoned or not.

Forcing moves are a good way to gain the momentum, and when used properly force the opponent into a series of weak forced replies. This is a good opportunity for the player to force a win or develop his connection while maneuvering the opponent into a disadvantageous position.

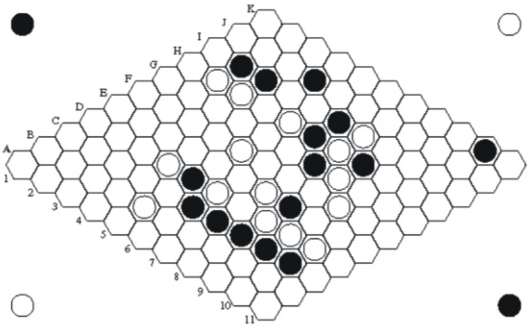
Next issue we will look at some more advanced points of strategy.

Puzzles

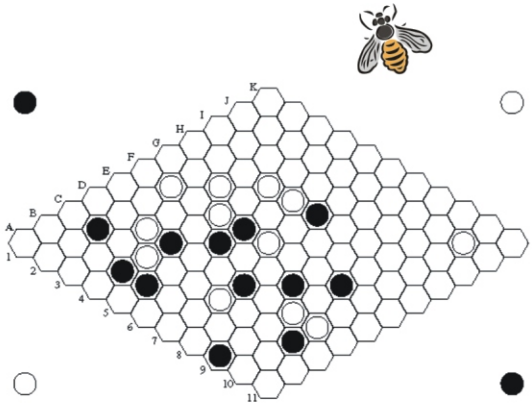
This first set of puzzles is a gentle introduction to the game based on combinatorial play rather than knowledge of strategy. Solutions are provided in the next issue. ■



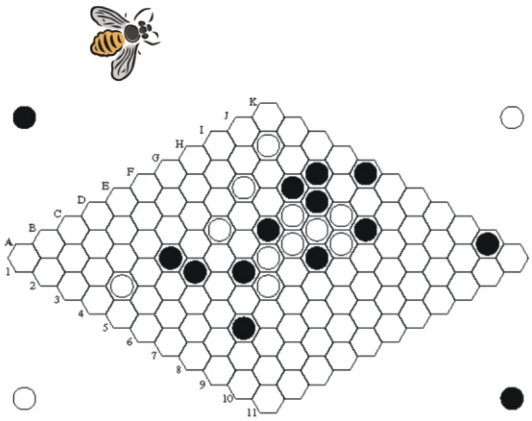
Puzzle A: White to play and win. This puzzle was devised by Piet Hein over 50 years ago.



Puzzle B: Black to play and win.



Puzzle C: White to play and win.



Puzzle D: White to play and win.

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Possessed by Fire Demons

An Interview with Colin Adams

Tenjiku Shogi, invented by Buddhist monks in sixteenth-century Japan, is one of the most esoteric of all abstract games. It is a Shogi variant and therefore a Chess-type game in that the objective is to capture the king. Tenjiku Shogi, however, is played on a 16x16 board with 78 pieces on each side. Its name in Japanese means "Exotic Shogi," and it contains a couple of innovations that are not found in any of the other Shogi variants, or in any other Chess-type game, for that matter: "jumping generals," a wild generalization of the Chinese Chess canon; and the fire demon, a truly fiercesome creature that annihilates any adjacent enemy pieces.

Colin Adams has studied this bizarre game and written a book about it. He epitomizes the best tradition of the lone abstract-game enthusiastic—he works not for recognition or financial gain, but purely for the love of the game. I took the opportunity recently to ask Colin a few questions about his specialty.

AG: What was it particularly about Tenjiku Shogi that attracted you to the game?

The very idea of a fire demon! The game is just so exciting to play. In October 1996, a month after I learned to play Chu I met Peter Banaschak at the German Shogi Open. He was doing a doctorate on Korean/Japanese/Chinese Chess history. I taught him to play Chu, and left him my address. He soon wrote to me complaining he couldn't find any opponents to play the game. We arranged that he would pick me up from the Nijmegan Shogi Tournament at the end of the year, and I'd stay with him over the new year holiday.

I brought my Tori set along thinking that he might be interested in learning that – but he had just got one. He asked me if there were any other variants I was interested in. I replied that I liked the sound of Tenjiku. He replied that he had just bought a set, but had not tried playing it yet. We ended up playing five games as well as many games of Chu. On the flight back home, I decided it would be a good idea to make a notebook about the opening moves, which were clearly critical. This developed into a full-sized book.

AG: How has our understanding of Tenjiku Shogi developed since it was first rediscovered?

Not a lot. My research has concentrated mainly on the opening. The big question is: Can Black wipe White out? Wayne Schmittberger seems to think that White has no satisfactory answer to Black's P-8k opening move. Certainly if he responds conventionally with P-9f or P-8f he gets wiped out. My latest research (in the supplement to the book) suggests that the response of P-7f (an astonishing move as it does almost nothing to develop, in a game where opening development is everything) gives White complete equality. But Black can go for asymmetrical exchanges, so the system is far from clear. Black can win a free king by force, without compensation, by opening P-9k, but this is almost nothing on the Tenjiku scale.

The excitement level is greatest in the opening and the endgame, and is very subdued in the middle game. The endgame is really TOO exciting. (If a fire demon breaks into the promotion zone, then the king has a short life expectancy.)

Many people have observed that a principal theme of the middle game is attempting to promote a water buffalo to a fire demon. It seems to me that this is only a threat to be exploited rather than a real possibility (before the endgame), as defending against the threat is relatively straightforward with a little planning.

The middle game definitely has a tendency to be quiet, like a giant version of Chu, but it tends to be a very tense affair indeed—one slight positional slip and a fire demon can break through the pawn wall and wreak havoc. The usual thing is for each side to have one fire demon during the middle game, which makes life hard enough. Black can force a middle game with all four fire demons on the board, if he so wishes, but he gets absolutely no advantage from the opening if he does so. This makes life really hairy. Black can probably win a fire demon (or two) by force if he wishes, but he probably pays too high a price for doing so.

Anyway, whenever I re-examine any of my previous analysis, I always find huge errors in my reasoning. So all of this has to be taken with a pinch of salt. One of the things I like about the game is that there are so many discoveries to be made by the amateur games player.

AG: Interesting point, but how accessible is Tenjiku? Do you need a knowledge of Shogi, for example?

No. In principle you can learn it from scratch. In practice one learns Chu Shogi first, as nearly all the Chu Shogi pieces are used in the game. In my book I do assume you are familiar with either Shogi, Chu Shogi or Chess, but that's about it.

I have taught people to play Chu Shogi who did not know how to play Shogi. I don't think I've heard of anyone trying to play Tenjiku who hasn't played Chu before. It would be an eccentric thing to do.

Actually I think even Chu Shogi is open to the development of original ideas. I have certainly had some during the three years I have been playing the game. Though the word "original" is perhaps not quite the right term -- since Chu Shogi has been played for hundreds of years in Japan, these ideas have surely all been thought of before. But since only six game records have come down to us, most of them will have been lost.

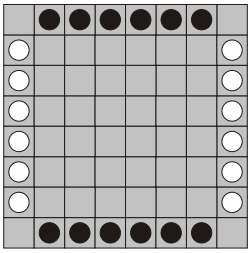
It took me a whole day to learn how to play Chu. Three months later, after playing several games of Chu, it took another day to "upgrade" to Tenjiku.

AG: What games aside from Tenjiku are you currently studying?

The only game I am studying is Chu. I am writing a program that I currently rate at around 8 kyu. My aim is eventually to get it close to master level, so that I myself can attain such a level.

AG: Restoring a forgotten game to master level play is a wonderful ambition. I wish you very good luck!

Chu Shogi is a Shogi variant played on a 12 x 12 board which dates from the thirteenth century. Although not played in Japan in modern times, Chu Shogi enjoyed considerable popularity in medieval Japan, particularly in court circles. We know that the game was developed to a high level, but almost all information about Chu Shogi has been lost. Both The Book of Tenjiku *and Colin Adams' Chu Shogi program are available on his website at http://www.colina.demon.co.uk/index.html. Chu Shogi and Tenjiku Shogi sets are available from George Hodges at PO Box 77, Bromley, Kent, UK.* ■



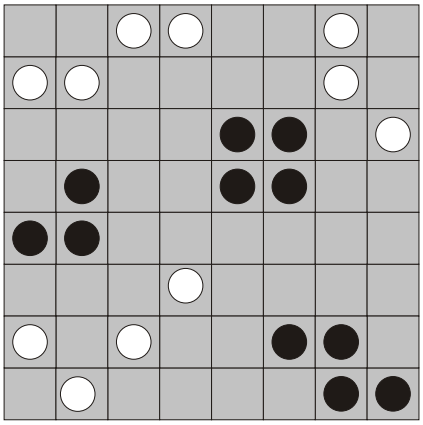
Lines of Action

Strategic Ideas -- Part 2

(See Abstract Games *Issue 1 for rules.)*

The first article in this series dealt briefly with what I refer to as the Wall opening. If a player is allowed to proceed with this strategy unhindered he will develop a wedge formation separating his opponent's pieces. He merely has to connect the remainder of his pieces into this tight group.

In most games one player does not usually let the other pursue this kind of strategy early on. However, the type of formation that arises during the Wall opening is an example of a more general type of strategy: pick a region of the board as a focus and aim to connect all of your pieces into that focal region. This has the advantage of naturally creating a main group that is tightly connected. I refer to this type of formation as "compact." The black groups in the diagram are examples of compact formations.



You will note that the removal of any one member of these compact groups does not disconnect the group. This makes a compact group difficult to attack effectively. Through some experimentation with these groups individually on an otherwise empty board, it is easy to see that with a compact group there are often many ways to move the individual members of the group without disconnecting the group. This flexibility of movement means that the group has the ability to shift position in order to block or evade attack or to connect up with a straggler.

In another popular LOA strategy, the player aims to quickly string together a connected group of pieces over a wide area of the board. I call this kind of formation "strung out." The white groups in the diagram are strung out. I find this to be an appropriate term because it nicely describes the tension in the position—in the same way that a "strung out" individual may easily fall apart under stress, a strung out group can easily fall apart under attack. Very often a strung out group has just one piece holding it together, which can easily become a target of attack. The other disadvantage with a strung out group is that a move by one of the pieces in the group can easily disconnect the whole group, meaning there is less flexibility. The concept of flexibility as applied here is a property of groups of pieces, but it has wider implications which will be covered in a future article.

Many players believe a central position is important in LOA and will therefore choose the center of the board when picking a focal region. I do not believe having a central position is of primary importance in LOA, and it may even be a disadvantage early on as it can be an object of attack.

Another advantage of the focal region/compact group strategy is that a player will often have a few stragglers some distance from the main group. These can be valuable attackers because of their distance from the main action and because of the ease with which they can be shifted to aim at different targets. Again, this will be dealt with in a future article.

Here is a game in which white tried to play the Wall opening and black put him under considerable pressure. It is a rare example of a win by the player behind on material and was achieved in large part because of the flexibility of white's compact position.

Hartmut Thordsen vs. Kerry Handscomb, played by email, January and February, 2000.

1. d1b3 a5c7
2. g8d5

A little surprising, as I had expected 2. b1b4 or 2. b8b5. Black is giving priority to taking a central position over blocking white's pieces.

2…. a7d7
3. b8b5 h7e7
4. f1c4 h3e6?

This connects into the focal group. In this case, however, it is not a good move as white has overlooked black's next move, which is a powerful attack.

5. b1c2!

Black has abandoned the Wall strategy, but it is difficult to see how white can defend c7. Perhaps 4….a2c2 or 4….h2f4 would have been the better move for white.

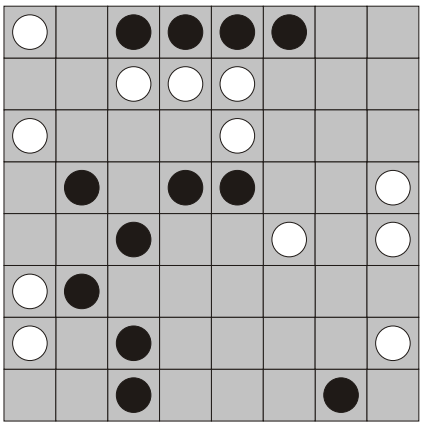
5…. h6f4

This move allows black a good next move to neutralize this defense of c7, but it is difficult to see what else white can do now. For example, 5….c7e5 dodges out of the way of attack and counterattacks d5, but it allows black the powerful defensive move 6. c1c5. White's chosen move does at least give him some counterplay.

6. e1e5

Black's pieces are effectively splitting white's forces now over a broad area of the board, and c7 is still under attack. White has to do something urgently.

6…. a4a8!? (Diagram)



This attacks c4 and precipitates a series of exchanges. Quite often a good move into the corner is overlooked because it is contrary to the accepted wisdom that central positions are best.

7. c2:c7 f4:c4
8. c8:c4 h2:e5
9. c7:e5

White has given up a piece at the cost of eliminating the tension on the c-column and opening up the position. His next move should probably be 9.…h5f7 to continue to hem in the black pieces. Instead he chose

9.… a6c6?

White is making this move before a3d6 in order to make the latter a stronger connection after black defends against a8:d5. White had not seen that black's obvious defense is actually a very strong counterattack. An attack against which your opponent can defend by improving his position is often a bad move.

10. g1g2

Threatening, of course, g2:c6, which is a very good for black. After the recapture e6:c6, white's position separating the two black forces is looking quite strung out. Since white has no defense against this threat he decides to continue with his focal region/compact group strategy.

10.… h5f7
11. b3d3

Black decides to make the capture g2:c6 even stronger because white's's only defense against d3:d7 blocks the recapture e6:c6. It is questionable, however, whether this is really the right move for black, as white's defense does in fact allow him to continue to consolidate his compact group. Perhaps 11. g2:c6 e6:c6, 12. f8b8 f7c7 (preventing b8d6 or e5c7), 13. b3d3 is a better plan because white no longer has the move a3d6 and he cannot defend with c6d6 because of c4:c7.

11.… a3d6
12. g2:c6 h4h5

White plans h5:e8 to isolate the piece on f8.

13. f8b8 f7c7

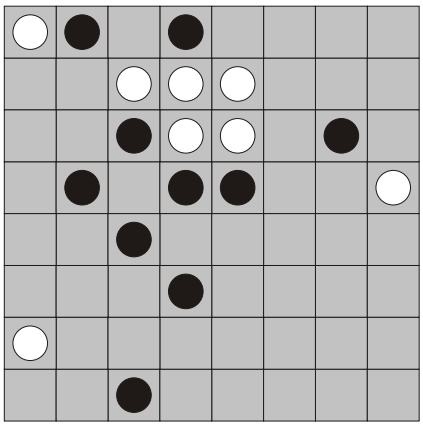
Black's c4c7 would be decisive. The flexibility of white's compact group is starting to show.

14. e8g6 (diagram)

Black prevents the strong white move h5f7. White is now two pieces down, which is usually a big disadvantage in the endgame; he has a strong compact focal group, but three stragglers which will be difficult to connect to the main group. His next move is the obvious first step.

14.… a2a4
15. b8b6

Perhaps it is a little too early for this move as it allows white an



excellent connection for his piece on a8. Black may be concerned about e7b7, but then d8e7 is a good move for him. Good combinations would be 15. c1c5 a4:c4, 16. g6e4 or 15. c1c5 a4a6, 16. b5b7. Note that c1c5 would set about strengthening his own compact focal group.

15.… a8c8

White is looking at c8f5 to block both of black's strong moves d3f5 and g6e4.

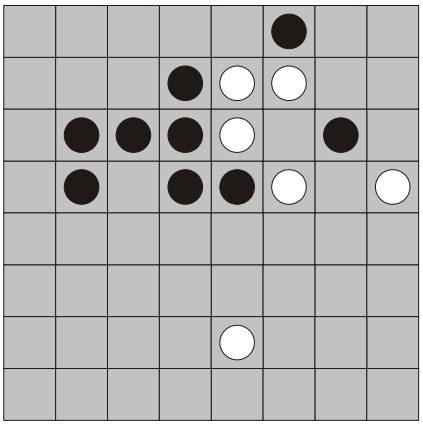
16. d8f8 c7f7

Necessary before c8f5, otherwise f8f6 is winning for black.

17. c1d1?

Yes, this sets up an unstoppable attack on the d-column, but much more important at this stage is g6e4, which would probably win: white cannot prevent the piece on f8 from breaking out and his own piece on a4 is now completely isolated. Even the combination 17. c1c5 a4:c4, 18. b6d4 gives black better chances. White's next move gives him the advantage.

17.… c8f5
18. d1:d6 a4:c4
19. d3:d7 c4e2+ (diagram)

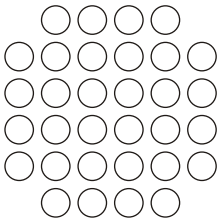


This begins an unstoppable winning combination. Note how white's compact group flows toward the center right edge of the board. Black's moves are the best moves to delay the inevitable.

20. d5f3 e7f6

White is threatening e2:e5+.

21. f8e8 f6g5
22. d7:f7 e6g4+
23. c6e4 e2f2+
24. e5g3 f2g2+
25. e4:g4 h5h4+
26. f3h3 g2f3++
27. b6e6 f3f6 wins ■



MEM

... a game ready for a revival

by David Pritchard

History

This highly original and little-known pattern-forming game once had a small cult following but was then lost to history. Sadly, this is a classic two-player game that deserves wider recognition. The only reason I can think of for its demise is poor marketing linked to lack of publicity.

The game was invented by Anatol W. Holt Hopfenberg and was first marketed in the United States by Stelledar Inc. of Philadelphia. It did not surface again as far as I know until it was relaunched in Germany a year or two back in an inferior production by *Das Spiel* of Hamburg. The name is derived from the first three letters of MEMory, and also from the French *même*, meaning 'the same.' ('Memory,' says the inventor obscurely, 'depends on representation.')

Components

The board measures 15x15 cm and is incised with 32 shallow cells in the shape at the top left of this page. The only other components are 32 lenticular polished stones, like large Go stones, but in a variety of striking hues that give the impression of a collection of gems. The stones are in 11 different colors made up (in my set) of eight turquoise, seven dark green, three each of dark blue and orange, two each of lime green, purple, yellow and grey, and one each of pink, brown and beige. The colors themselves are not important; it is the numbers of each that are significant. They could equally be represented by, say, letters or figures or symbols, but the visual appeal would then be lost.

Play

Mem, in fact, is two games, both using the same equipment, Mem itself and Mini-Mem, and the game can also be played solitaire. At the start, whichever version is played, the stones are placed on the board one to a cell at random so that all cells are occupied. For those who like figures, the number of possible different starting positions is, in round numbers, a 1 followed by 21 noughts, enough to daunt computers for a bit. Certain rules are common to all versions of Mem. The board is placed between the players such that there is adequate table space between the board and the players. (In the solitaire version, table space is only required between the board and the player.)

A turn consists of taking any stone from the board and placing it on the table in front of one. After the first stone is placed, the second stone must be placed next to it either horizontally or vertically. Thereafter, a stone taken from the board must be placed adjacent, either horizontally or vertically, to at least one of the stones previously placed. In short, all the stones of a player must form an orthogonally-linked group. This group must always match the pattern of at least one group on the board both in shape and orientation. The colors in a player's group, however, need not correspond to those on the board and indeed, in practice, rarely do so. Supposing a player, after his sixth turn, has a line of stones ABBCDB (different letters = different colors). This must correspond in pattern to a line on the board which, for argument's sake, could be EFFGDF. Remember: it is the pattern that matters, not the individual colors. Stones once placed cannot be moved. You may not take from the board a stone that is an essential part of your opponent's pattern. If there are, say, two such patterns on the board that match your opponent's pattern, he cannot object to one of them being disturbed. Notice that a stone or stones on the board can form part of both players' patterns. A player unable to continue a pattern ceases play. When both players pass, the game ends and the player with the most stones wins. These are general principles common to all Mem games.

Mini-Mem

In Mini-Mem, players make two moves a turn. If only one move is possible, this is forfeit.

Solitaire Mem

In Solitaire Mem, the aim is to build as large a pattern as possible – ideally, a pattern of 16 stones (the maximum) matching the pattern of 16 stones remaining on the board.

Mem

The game of Mem itself follows the above rules, but with two additional options open to the players: *capturing* or *blocking*.

Capturing
A player, on turn, may capture a group of stones on the board provided ALL the following conditions are fulfilled:

- The group comprises at least two stones;
- The group is isolated; that is to say, it has no orthogonal connections to any other stone or stones on the board; and
- The board pattern exactly matches the player's pattern.

The player takes the group of stones from the board, adds the stones from his pattern and puts them to one side to form a captured pile. If there is more than one group on the board that matches the player's pattern, only one such group may be captured. On his next turn, the player will start a new pattern. A player, on turn, may (1) move; (2) capture; (3) move, then capture; (4) pass, but only if the player has neither legal move nor capture. A player who makes a capture has an extra turn. You are allowed to capture your opponent's only match; after that, he must pass on every turn.

Blocking
You may block your opponent's move (i.e., disallow it) if he attempts to take a stone from a group on the board that matches your pattern, provided your pattern has two or more stones. To block, you announce "I block that." You must then indicate the stone in your pattern which represents the stone your opponent wants to take. So long as the stones in your pattern remain in place (i.e., you do not subsequently make a capture), they must continue to represent the group you indicated. Thus the effect of blocking

(continued opposite)

MEM (continued)
is to limit your options on what groups can be legally matched. When you are about to move a stone you may ask your opponent whether he will block the move. If he answers "No," you must take it; if he answers "Yes," he must indicate the stone in his pattern which is blocking the intended move. After a player is blocked he must choose a different move or pass if none is available.

Summary and Conclusions

Remember that after each move, the group on the table in front of you must match a group on the board both in orientation, shape and color distribution. Thus, if two or more stones in a group on the board are of the same color, then the corresponding stones in the player's group must also be of the same color.

Mem is both a subtle and difficult game which requires great foresight to play well. It is also (a big bonus, in my opinion) visually and aesthetically pleasing. If you want to try it, it is easy to draw up a board when all that is needed is colored counters in the quantities indicated above.
HINT: Match high-frequency colors to high-frequency colors, and low-frequency colors to low-frequency colors. ■

David Pritchard needs no introduction as the former Editor in Chief of, to my mind, the best game magazine ever, Games & Puzzles. *He lives in England and is a game consultant and prolific writer on games. -- Ed.*

Twixt puzzle solutions

Puzzle I: 1. F4 and now: 1....H3, 2. G6** threatening I5** or J9*; or 1....F5*, 2. H3** E3*, 3. E2**; or 1....E3, 2. E2**; or 1....J4, 2. G6** J10*, 3. K4* F3, 4. E2** threatening H3** or I5**; or 1....F3, 2. E2** H4* (or 2....G5**, 3. G6** threatening I5* or J9*), 3. G6** G9*, 4. I4* E1*, 5. G5* connecting via E4 or E6.

Wrong first moves: 1. G4 G5, 2. I5* I6*, 3. F6* (or 3. J7* F3*) J4*, 4. J8* F7**; or 1. H3* E3, 2. F2* C4*, 3. E4* E5**; or 1. J8* G4*; or 1. H4 G4*, 2. F3* E3*, 3. D2* C2* and now 4. B1** would be illegal; or 1. H2 G4 is similar; or 1. F2 H3, 2. I3 (or 2. G3 F4*) J4*.

Puzzle II: 1. J7* and now: 1....I4, 2. I5*; or 1....H2, 2. H4 I4*, 3. J5** F3*, 4. K3*; or 1....G9*, 2. F7**; or 1....H7*, 2. I9*; or 1....G6, 2. F5* (2. E6* also works) H8**, 3. E6* E8* (or 3....C5**, 4. G7**), 4. F9* G9**, 5. C5* C3*, 6. C4* B3 (trying to draw), 7. D7* C9 (or 7....B9, 8. E9-E6/D8/G9+D7/E9 and White will connect via B6 or E5), 8. C10* and D7 connects to the top via B6 or E5, and to the bottom via B8 or E9.

Wrong first moves: 1. F7** I4, 2.E3 (or 2. I3 H2*, 3. J5* J3*, or 2. I5 J6*, 3. H3* H5**) F2*, 3. D5* D7* (or 3....B4), 4. C6* B4, 5. C4** (stopping D3**) C5*, 6. B6* (6. A5** would be illegal) B7*; or 1. H7 I7, 2.J 6* (or 2. J7* G6*, 3. F5* G9*) G8**; or 1. J5* H7*; or 1. E6* E8*, 2. F9* C5*, 3. J7* G9**.

"A NICE EGG HOLDER"
or "Competition in the Marketplace"

by Kerry Handscomb

We were making our way home across Vancouver one evening when we spotted a colorful Mancala board in the window of a Salvation Army store. It was unusual because it had two rows of five holes rather than the usual six, making it ideal for Christian Freeling's Glass Bead Game. The store was closed, so I returned the next day. Again I was thwarted as the store clerk said it was a special sale item and that would only be sold on Saturday morning. "There's a line up," she said, "and it's first come, first served."

Not wanting to miss my chance, I was back at the store half an hour before opening time on Saturday. I was surprised to find six or seven people already lined up. These were regulars. The lady in front of me said they had been there for over two hours already. She wore a different colored shoe on each foot.

There was a certain amount of good-natured banter in the line up, but it clearly masked a fierce competition for the best bargains. I started to worry about my game. It did not occur to me that this obscure item would not be in great demand. When the fellow behind me asked me what I had come for, I was even a little evasive. "Don't worry," he grinned, "I won't take it from you."

When we got into the store at last, there was quite a scuffle as the regulars pounced on old fur coats, used brass lamp stands, and the like. No one was interested in the Congklak board, so I could grab it right away. As I proudly went to pay for my treasured game board the lady with the mismatched shoes took a look at it: "That's a nice egg holder," she said. ■

What's the next best thing to playing games? Reading about how to improve your play!

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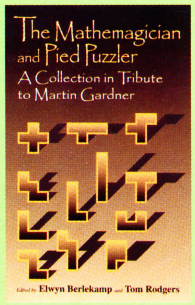

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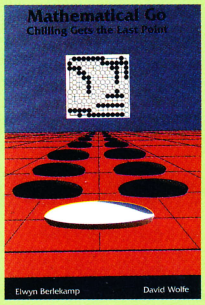

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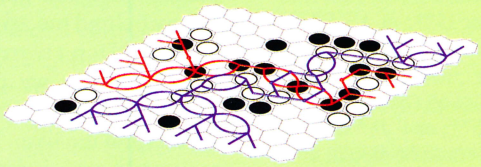

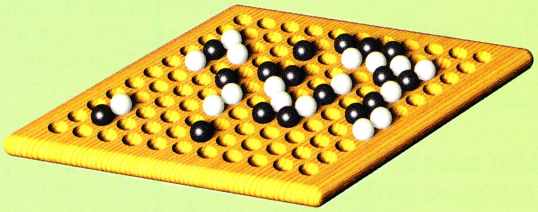

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