

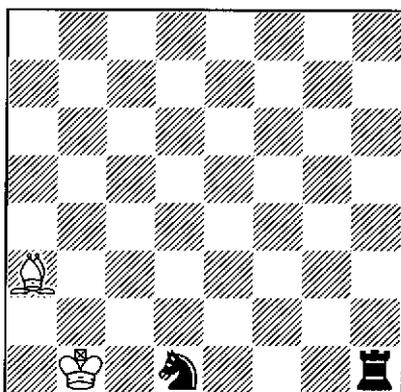
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Endgames in Chess Variants (5)



Losing Game. WTM, 1 Ka1/Kc1 Nb2 2 Bxb2 RxK 3 BxR. BTM, why not 1...Rg1?

Further discoveries in the Losing Game

More about generalized knights

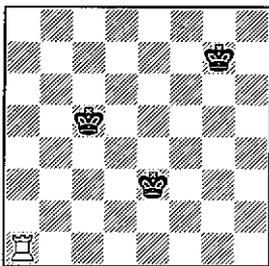
Endings in Circular Chess

Reciprocal zugzwang in XiangQi

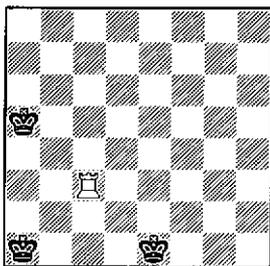
Further discoveries in the Losing Game

It has become a tradition that these "variant" numbers of *BESN* start with two pages on the Losing Game. Regular readers will need no reminding of the rules: capturing is compulsory, a player's object is to lose all his men, the king is an ordinary man which can be captured, and a pawn may promote to it.

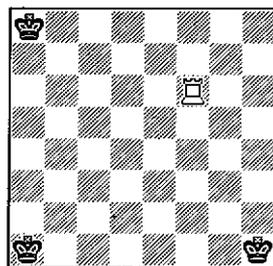
My 1997 computer analysis of three-man pawnless endings seems to have prompted a rush of activity. Laurent Bartholdi analysed the three-man endings with pawns and also three kings against rook, and then "Angrim" (Ben Nye) did the other four-man endings. Some of his results have appeared on the Internet, with notes either by himself or by Fabrice Liardet, and quite fascinating they are. Would you have guessed that $Kb1/Bf6/Ne5$ have a 74-move win against $Ka4$, or that the longest 4-man wins of all, $Bb2/Nc1/Pf3$ v $Kg1$ and $Bd2/Ng1/Pf3$ v $Pg3$, take no fewer than 87 moves? But we have room for only a few examples here, and I shall concentrate on some straightforward but striking positions of reciprocal zugzwang.



1 - the rook is dominated



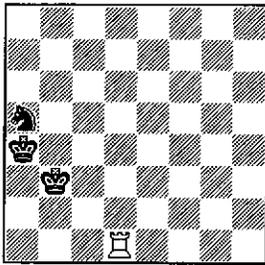
2 - whoever moves loses



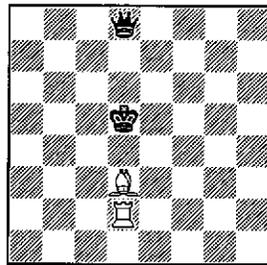
2a - BTM, after 7...Rf6

Three kings usually win against a rook by consolidating and then advancing, aiming to reach a position such as 1 (but not one of the apparently equivalent positions with the kings in line, $g7/e5/c3$ or $c7/e5/g3$, when $Ra5$ or $Re1$ wins for the rook). Regarding 2, I quote Fabrice: "Clearly, White at move would have to allow the kings to regroup, after which Black wins as is normally the case with three kings against a rook. But if Black is to move the kings get quartered." **1...Ka6 2 Rc4 Kf1.** "Ka1 can never move, because it would allow the rook to attack him: $2...Kb1$ $3 Rb4!$ or $2...Ka2$ $3 Rc2!$ with transposition into a rook versus king ending. So Black can do nothing better than move his kings into the corners." **3 Rd4 Ka7 4 Rd5 Kg1 5 Re5 Ka8 6 Re6 Kh1 7 Rf6** (see 2a) and now a Black king must move to his detriment.

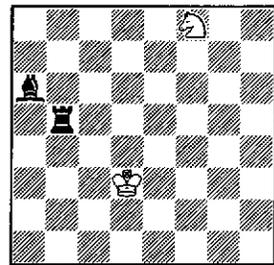
3 is an interesting position. White to move must give way, and $bKKN$ will gradually advance and win against wR . For BTM, I again quote Fabrice: "It is very surprising that Black can't find any good move here: **1...Kab4 2 Rd3!**, **1...Kaa3 2 Rb1!**, **1...Kb5 2 Rd4!**, **1...Kbb4 2 Rb1!** and finally **1...Kba3 2 Rd6!**" The same position two ranks up is again reciprocal zugzwang, but not one rank up nor three! Three ranks up, Black can play **1...Kba7** since the reply $Rd9$ is unavailable; one rank up, Black can play the equivalent move **1...Kba5**, since $2 Rd7$ can be met by **2...Nb8!**



3 - whoever moves loses



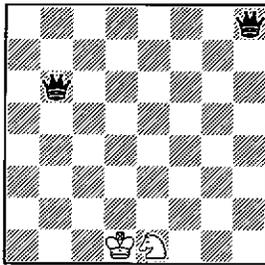
4 - whoever moves loses



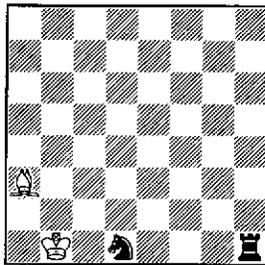
5 - whoever moves loses

4 seems to offer each side a safe move, but... WTM, **1 Rd1 Qd6** and **2 Rh2** is no longer available; BTM, **1...Kd6 2 Rh2!** and **2...Qh4 3 Rxh4** is now a win for White.

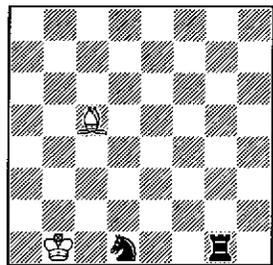
Fabrice describes 5 as "Funny one ... No good move for the knight". **1 Nd7/Ne6 Rc5 2 Nxc5** and wN defends wK, **1 Ng6 Re5** similarly, **1 Nh7 Bc8 2 Ng5 Bxg5** and Black wins with RB v K. If say **1 Ke3** then again **1...Bc8** and a win with RB v K, since the previous reply **2 Ne6 Bxe6 3 Kc4** is no longer available.



6 - whoever moves loses



7 - whoever moves loses



7a - after **1...Rg1 2 Bc5**

In 6, BTM, **1...Qb8 2 Ke2** immediately dominates both queens, but after **1...Qa7** White must be careful: not **2 Nc2? Qa3 3 Nxa3 Qf6!** but **2 Ng2!** with two similar lines **2...Qh4 3 Nxh4 Qb8 4 Kd2** and **2...Qe3 3 Nxe3 Qb8 4 Kd2**.

But I think Fabrice's favourite is our front cover study 7. WTM, **1 Ka1/Kc1 Nb2 2 Bxb2** and the White king is defended; BTM, why indeed not **1...Rg1?** Because of "one of the most amazing moves I have ever seen": **2 Bc5!!** To attack the rook appears suicidal, but Black can leave it attacked only by playing **2...Nb2**, since **2...Nc3** will counterattack, and after **3 Bxg1** the knight will have to move away from the king.

My "first survey of Losing Chess endgame material published up to the end of 1999" is now finished, and copies are available from myself without charge. In addition, Ralf Binnewirtz has produced a very attractive book Schlagabtausch im Räuberschach containing some 150 Losing Chess compositions from 1901 to mid-2000. This is a beautifully produced book with all compositions in diagram form (144 A5 pages, soft cover, around 150 diagrams, text in German) and is available from Schachhaus Mädler, Wagnerstrasse 5, D-01309 Dresden, at DEM 24.80 including postage. - JDB

More about generalized knights

In our special number 4 (December 1996), we reported some computer research by Václav Kotěšovec in which he analysed the ending "king and two leapers against king" on all boards up to and including 8x8. Václav has now extended this analysis to larger boards, and he announced his new findings in a recent edition of the Bratislava magazine *Pat-a-mat*. We remind readers that an "x-y leaper" is a man that moves *x* squares in one direction and *y* squares in another, irrespective of whether the intervening squares are occupied (so the ordinary knight is a "2-1 leaper").

"The results are mildly surprising," writes Václav (my translations throughout). "Endings which are won on the 8x8 board become drawn once the board exceeds a certain size. The problem is that of penning the enemy king into a corner. On a larger board the lone king has more room to manoeuvre, and if it plays correctly it can keep the superior force at bay."

On the 8x8 board, the results were as follows:

Winning combination	Longest win
1-0 + 2-1	45 moves
1-0 + 3-1	77 moves
1-0 + 4-1	55 moves
1-0 + 6-1	93 moves
2-1 + 3-1	49 moves
2-1 + 4-1	41 moves
2-1 + 6-1	53 moves

These are "general" wins in the sense that these combinations of pieces, if they can overcome any immediate threats by the defender, can organize themselves and proceed to victory irrespective of where the opposing king may be placed.

For larger even boards, Václav found the following:

Winning combination	Longest wins	
	10x10	12x12
1-0 + 2-1	71 moves	194 moves
2-1 + 4-1	61 moves	
2-1 + 6-1	78 moves	
2-1 + 8-1	123 moves	

Only three of the winning combinations on the 8x8 board are still winning on the 10x10 (the fourth combination, 2-1 + 8-1, does not exist on the 8x8 board), only 1-0 + 2-1 is still winning on the 12x12, and none of them is winning on the 14x14. Václav gives the 12x12 position requiring 194 moves as $wKa1, Wa12, N11, bKj4$ ("W" = 1-0 leaper), but he does not spell out the play.

The situation regarding odd boards is more complicated, because leapers such as the 3-1 are restricted to squares of one colour and the result may depend on the colour

on which they run. There are also "doubly even" leapers such as the 2-4, which are restricted to a quarter of the squares on the board. There are several winning combinations on a 9x9 board, but only 2-1 + 3-1 and 2-1 + 5-1 win on the 11x11 board and only 2-1 + 3-1 on the 13x13, and in each case the 3-1 or 5-1 leaper must run on the colour of the corner squares. Interestingly, the combination 2-1 + 3-1 is only drawn on the 12x12. The 13x13 position requiring the most moves (119) is wKa1, N113, Cm13, bKa3 ("C" = 3-1 leaper).

Václav points out that if an ending is drawn on a board of size n , it is automatically drawn for size $n + 2$, $n + 4$, and so on. There remains the possibility that there may be wins for combinations which do not exist on smaller boards (for example, 2-1 + 8-1 on the 10x10). However, "in view of the limited powers of movement of such leapers it is very unlikely that further endings of this kind are won (for example, 2-1 + 10-1 on the 12x12 is drawn). For boards up to 12x12 I have examined all possible combinations of leapers, for larger boards only those which are won on smaller boards."

"Thus it is possible to announce, almost with certainty, that **all endings of this kind are drawn on boards larger than 13x13**" (Václav's emphasis). I concur.

Václav concludes his paper by asking whether there might not be sets of *three* leapers which can combine with a king to force mate against a bare king on a board of any size. My answer to this would be "No", and it would remain "No" even if "three" were to be replaced by any other number. This conclusion results from consideration of the question "How many knights does a king require?" which I raised in our special number 8, which I am increasingly convinced cannot be answered by any finite number (in other words, however large k may be, there is always an n such that a king and k knights cannot force mate against a bare king on an $n \times n$ board).

My reasoning is as follows.

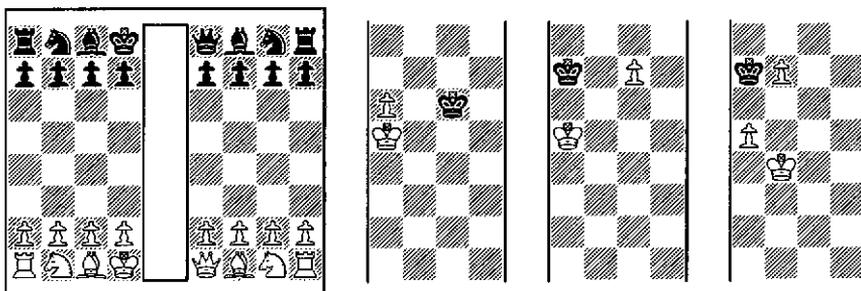
1. In general, on an infinite board, the lone king can escape (he simply runs away, and at most two knights can keep up).
2. In general, on an infinite board, the lone king can play to cross any horizontal or vertical line unless the opposing king is on one of the squares directly in front of it (he runs to a great distance on the side that the opposing king is not, and then either advances against at most two knights or outflanks a now unattended king).
3. If the opposing king *is* on one of the squares directly in front of the lone king, the lone king cannot cross the line, but he can draw by perpetually threatening to do so.
4. We can hope to transfer 2 and 3 to a finite board by defining a "sparse neighbourhood" in some way (adequately far from all edges and not too many knights nearby), and then proving that on a sufficiently large board a king in a sparse neighbourhood can always either (a) play to cross a vertical or horizontal midline *and reach another sparse neighbourhood* or (b) force a draw by perpetually threatening to do so.

If anyone can make this or some similar argument rigorous, he may put his name to it and publish it with my good will.

If any reader would like a copy of Václav's paper, I will see if I can get the relevant issue of Pat-a-mat sent to him. His text is in Czech, but the table of results should be easy enough to understand even without a knowledge of the language. - JDB

Endings in Circular Chess

The game of Circular Chess has medieval origins (see the Cotton Library manuscript "Cleopatra B. ix" which the British Library was once kind enough to let me see), and today is enthusiastically practised by a group based on the Tap and Spile in Hungate, Lincoln. They play on singularly attractive own-design wooden boards, and they run an annual championship open to all, an occasional newsletter, and other activities.

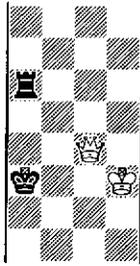


1 - board and game array 2 - WTM only draws 3 - draw only 4 - not 1 a6!

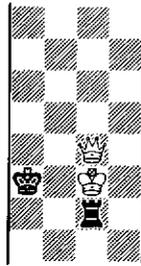
The board consists of four concentric rings shown diagrammatically in 1 above (imagine the a and h files joined end to end to form one 16-square ring, the b and g files joined similarly, and so on). The original rules are lost (a possibly relevant passage in the manuscript has been obliterated, though modern X-ray technology and computer image enhancement might enable somebody expert in the languages of the period to recover something) and the Lincoln group plays to natural modern rules: on an empty board, bRa8 commands the whole ring, bNb8 commands e8/f7/h7 as well as a6/c6/d7, bBc8 e8/g8/h7 as well as b7/a6/d7, and so on. Pawns promote as usual.

The absence of corner squares means that K + R v K is only a draw, but K + Q v K is still a win, and K + P v K is usually won even with a side pawn because there is no stalemate defence. An exception is shown in 2 (the rest of board assumed is empty, as in all subsequent diagrams) where Black to play duly loses but White to move must cede his pawn. Other differences from the normal game are shown in 3, which is drawn because promotion to rook no longer wins, and the related 4, where the move 1 a6 necessary to win in ordinary chess is the only move that does *not* win at Circular!

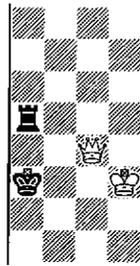
Q v R appears to be a general draw, because if the king and rook are far apart on the same ring there is neither fork nor skewer, but there are mating possibilities if the attacking king is close. (All the analysis in this article is my own, and should be read with caution.) Consider 5, where Black must rescue bR and White threatens Kc3 with mate to follow. Black has four ways of avoiding this mate: (a) 1...Rd6+ 2 Kc3 Rb6, which allows a fork; (b) 1...Ra4 attacking wQ, when White has 2 Qc3+ Ka2 3 Kc2; (c) 1...Ra2, when 2 Kc3 can be met by 2...Rc2+ and either capture will give stalemate (see 6) but White has 2 Qc3+ Ka4 3 Kc4 echoing (b); (d) 1...Kb2, which loses bR at once. Put bR elsewhere, however, and 1...Kb2 may well be a drawing move. It fails



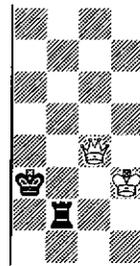
5 - Bl loses



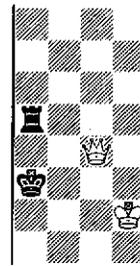
6 - a trap to avoid!



7 - Bl loses



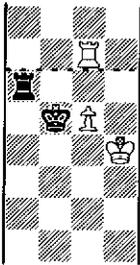
8 - no win



9 - Bl draws

with bR on a5 (see 7, 1...Kb2 2 Qc3+ forking) or a7 (2 Qd4+), and also with bRa1 (2 Qc2+ Ka3 3 Kc3), but it appears to draw with bR on a8 or on a9...a16 (b8...h1).

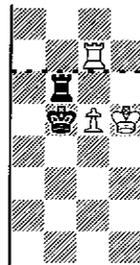
Black also appears to draw if his rook is already on the b-ring, because he can play 1...Rb2 giving 8. Now 2 Kc3 is met by 2...Rc2+ giving 6, and how else is White to make progress? Nor can White win unless his king is on exactly the third rank. Put it on c2 or d2, as in 9, and Black draws by 1...Ra2+ (2 Kc3 Rc2+, 2 Kd3 Rb2).



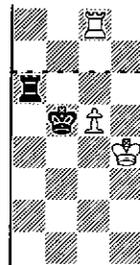
10 - Bl loses



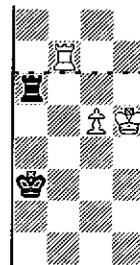
11 - Wh wins



12 - Bl loses



13 - Bl loses



14 - no win

R + P v R appears normally drawn because the defender can afford to swap rook for pawn, but may win if the pawn is far advanced. Consider 10-14, which show ranks 3 to 10. Rooks belong behind passed pawns, but on an open ring "behind" is the same as "in front of". BTM in 10, 1...Ka7 2 Kc6! (2 Ra9+? Rxa9 3 c8Q gives 9 and only draws) Ra6+ (2...Ra1 3 Kd7 Ra8 transposes, or 3...Rd1+ 4 Kc6) 3 Kd7 Ra8 (see 11) 4 Ra9+! (now this works) Rxa9 5 c8Q giving 7, or 1...Ka6 2 Ra9+! Rxa9 3 c8Q+ etc, or 1...Kb6 2 Rb9+ Ka7 (2...Ka6/Ka5 3 Rb8 and wP will promote) 3 Kd7 Ka6 4 Ra9+ (4 Rb8? Ra7 pinning), or 1...Ra6+ 2 Kd7 Ra8 3 Rb9+ Ka7/Ka6 4 Ra9+, or 1...Rb8 2 Kd7 (see 12) with 2...Ra8 3 Rb9+, or 2...Ka7 3 Ra9+ Kb7 4 Rb9+ Rxb9 5 c8Q+, or 2...Ka8 3 Rc8. WTM in 10, 1 Rc10 (see 13) and much the same, but not 1 Kd7 Kb6 2 Rb9+ Ka5 (see 14) and Black draws (3 Ra9+ Rxa9 4 c8Q Ra6 draw, 3 Rb8 Ra7 pinning, 3 Rb7 Ka6 etc, 3 Kd6 Rc8). Please report any errors.

This year's Circular Chess Championship will be held at the Bishop's Palace, Lincoln (near the Cathedral) on Sunday May 20, starting at 1000. Details from Dave Reynolds, 11 North Parade, Lincoln LN1 1LB, or from myself. - JDB

Reciprocal zugzwang in XiangQi

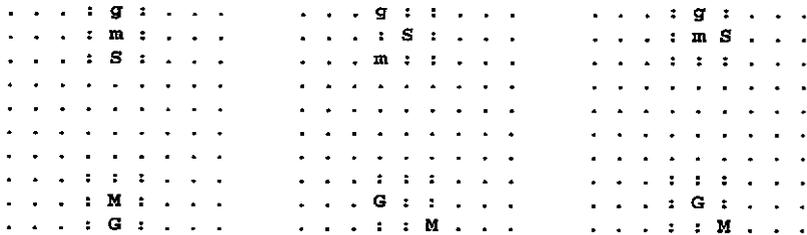
The game of XiangQi (Chinese Chess) has several differences from our own, one being that the "general" (the royal piece) is confined to a 3x3 region known as the "palace" instead of being allowed to roam freely. This means that positions of reciprocal zugzwang are rare, because an attacking side needing to wait for a turn can normally do so simply by moving its general. "Whoever moves loses" positions can be created, but only in rather artificial situations where both generals are under attack. However, **1** shows a remarkably simple position "Black to play loses, White to play cannot win" which Paul Byway spotted and reported last year in *Variant Chess*.

The board is 10x9, and the moves of the pieces involved are as follows.

General (G): One square horizontally or vertically, confined to the palace (the points denoted by ":" in the diagrams). Stalemate is a win, and the two generals may not face each other on the same file with no intervening man.

Mandarin (M): One square diagonally, confined to the palace.

Soldier (S): When in the opponent's half of the board, as here, one square forwards or sideways (not backwards). There is no promotion.



1 - White GMS v Black gm

1a - Black is lost

1b - Black is again lost

Before we start, consider positions **1a**, where bM is pinned by the rule "generals may not face each other" and Black is elegantly stalemated, and **1b**, where bM is again pinned and 1...Gd10 2 Sxe9 is another win by stalemate. These are the key winning positions. With Black to move in **1**, play starts **1...Md10** (1...Mf10 is equivalent by symmetry, and other moves concede bM with a quick or immediate loss) **2 Sf8!** (wS must go to the opposite side from bM - 2 Sd8 Gf10 3 Sd9 Gf9 4 Sxd10 is only a draw, bG having f8/f9 as a permanent haven) **Gf10** (if 2...Ge9 then 3 Gd1 Ge10 4 Sf9 Me9 5 Mf1 and either 5...Md8 6 Gd2 Gd10 7 Se9 giving **1a** or 5...M-- 6 Gd2 Me9 6 Ge2 giving **1b**, and if 2...Me9 then 3 Sf9 M-- 4 Gd1 and very much the same) **3 Gf1 Me9** (3...Ge10 4 Sf9 Me9 5 Ge1 will transpose) **4 Sf9+ Ge10 5 Ge1 M--** (5...Gd10 6 Sxe9 stalemate) **6 Gd1** and again we shall reach positions equivalent to **1a** or **1b**.

But White to play cannot preserve the symmetry, and Black will have a way out.

If you enjoy this occasional supplement to our usual fare, try the magazine Variant Chess: Peter Fayers, 2 Beechwood Avenue, Coulsdon, Surrey CR5 2PA, £8 for four issues (£9 Europe, £11 elsewhere). Specimen copies are available from myself. - JDB